Utilization of Reserves To Save a USAF Buck

ization of Air Force Reser- terests of economy as well re obvious benefits were ir Force commander. William Jones, chief rial Port of Em- members of tending the mposium

very ro- o

ing expensive and hard-to-get civilian overtime and premium pay. This enables us to stretch the Air Force transportation dollar further than ever before. Having the four Reserve squadrons here for summer encampments during July and August will allow us the unique flexibility of scheduling the summer vacations of our civilian and regular military employees without detriment to our work schedule."

Another benefit described by Maj. Jones is the agreement with the 71st and 72nd APS which allows the Tinker terminal to request extra Reservists during unforeseen peak workload periods. so beneficial is the "civilian expertise" h Reservists bring to many of the nal operations. Another plus is od community relations that ac- he Air Force when it uses Re- constructively. Maj. Jones

bably the most important trong Reserve program is ent of a serious national highly trained, experi- d Reserve unit is ready eployment when called. times, having Reserve nything less is a serious national security."

AFRes Battling Cattle Disease

C-7 "Caribous" of the 94th TAG, AFRes, have helped eradicate what was formerly an annual $1 million loss of cattle in Puerto Rico from screw worms.

The planes, from the 918th TAG, Dobbins AFB, Ga., and the 908th TAG, Maxwell AFB, Ala., have air-dropped cartons containing hundreds of millions of what are described as "sterile screw worm flies." The result, when these mate with non-sterile flies, is no egg production—no screw worms.

Carry Active Duty Rank Into Reserve

Air Force officers leaving active duty who immediately join a Ready Reserve unit can carry with them into the Reserve and serve in their active duty (temporary) grade even though it is higher than their permanent Reserve grade.

This change in policy was made in order to give impetus to "Palace Chase" the program by which an officer can opt to leave EAD earlier than his normal release date to participate in the Reserves.

e Reserve service this year are, l., a version of the CH-3/HH-3 nd Recovery Squadron (ARRSq), Homestead AFB, Fla., and the 304th ARRSq, Portland, Ore., as well as the 301st.

USAFR Budget Slashed By Congressional Action

Along with the other Reserve Components, in fact, with all of the services of DoD, the Air Force Reserve has taken very damaging cuts in its FY '74 budget through actions of the House and Senate Appropriations Committees.

The House Committee, presuming that the Air Force Reserve could not possibly recruit the non-prior service personnel programmed, has for FY '74 reduced its personnel appropriations by $12 million, which is the total of more than 10 percent of that requested for the USAFR Component (less ROTC) funds. It is not known why the Air Force took such an inordinately deep cut.

Actually, it asked only for $10 million to support the non-prior services program, but the House reduction of $12 million was applied against the non-prior service program "short fall." In other words, if the Air Force did not recruit another NPS airman, it would still be short $2 million for Reserve personnel funds.

Also, a reduction of $4.6 million was made in O & M funds from which is bought aircraft fuel among other items, and $2.4 million of that cut was applied by the House by reducing the Air Force Reserve request for 390 additional technicians for the new C-5 associate units to 190, a reduction of 200.

The squeeze in O & M funds will be even greater than is apparent from these cuts, since, as will be the situation throughout the Defense Department, the Appropriations Committees refused to allow any increase in O & M funds to compensate for increased costs of fuel, which is expected to be double the cost per gallon over that paid during FY 1973.

932d Aeromedical Has C-1 Rating

The 932d Aeromedical Airlift Group (Associate) has been awarded a C-1 rating, the highest AF operational-ready status, and was named Outstanding Aeromedical Evacuation Unit of 1973 in the AF Reserve. This group is the only one of its kind in the AF Reserve with its responsibility of airlifting DoD patients to and from military and civilian hospitals for specialized treatment.

This Reserve group in association with its active duty counterpart, the 375th Aeromedical Airlift Wing (MAC), airlifts more than 60,000 sick or wounded servicemen or their families each year. An average airlift mission lasts about 14 hours, covering some 2000 miles, with 8 to 10 landings. More than 40 missions are flown weekly.

College Credit For AU ECI Courses

Air University's Air War College (AWC) and Air Command and Staff College (ACSC) recently received undergraduate and graduate credit recommendations for the Nonresident Correspondence and Seminar Programs. The Commission on Accreditation of Service Experiences (CASE) of the American Council on Education made the recommendations. This is a significant development for Air University's senior and intermediate nonresident professional military education schools.

As a result of their evaluation, the Commission made the following recommendations:

Graduate level. AWC (both programs) and ACSC Nonresident Seminar Program (for students rated outstanding or excellent): International Relations, 4 semester hours; Personnel Management, 2 hours. ACSC Correspondence Programs (for students rated satisfactory): International Relations, 3 hours.

Baccalaureate level. AWC (both programs): 24 semester hours in the areas of political science, international relations and government and personnel management. ACSC Nonresident Seminar Program: 24 hours of upper-division credit in the areas of social sc... and personnel management; ACS... respondence Program: 15 ho... social sciences and person... ment.

AWC Seminar an... graduates and ACS... may contact the ... demic Service... Ala., 3611... to a sp... ponder... cript... In...

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Life Membership

$100.00 ☐ at 61...

☐ over 80, $45.00...

Name ___

Rank and Service ...

Address ___

Date of Birth ___

RESERVE O...

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
VETERINARY SERVICES
FEDERAL CENTER BUILDING
HYATTSVILLE, MARYLAND 20782

Subject: Egg Mass Data from Test Pens in Puerto Rico

January 18, 1974

To: W. W. Bird
Veterinarian in Charge
Veterinary Services
Miami, FL

Dr. Victor Beal requests egg mass data from test pens on the Island of Puerto Rico. We are unsure of the exact dates, but during the first 6 months of 1973 APHIS strain flies were dropped on one part of Puerto Rico and Puerto Rican strain flies were dropped on the other part of Puerto Rico.

We understand that there were test pens on each part of Puerto Rico. We are in need of the egg mass data from each of the sets of test pens. We would like to have this data broken down by week. We would also like to have the dates during which the Island was divided between APHIS strain and Puerto Rican strain flies.

Please send any information you have on this to me and we will make it available to Dr. Beal.

M. J. Tillery
Regional Director - Southeast Region

cc:
O. H. Graham, ERD, Kerrville, Texas ✓

5116

Screwworm Research Laboratory
P.O. Box 986
Mission, Texas 78572

January 18, 1974

Subject: Official Travel in Mexico in Connection with Screwworm Research Activities

To: All ARS Personnel with Official Passports

Now that the Joint Screwworm Eradication Commission is in operation, it will be necessary for us to modify our procedures for planning and conducting field work in Mexico. In all cases, we will need to notify the Director of the Joint Commission in advance of our intention to enter Mexico. By either letter or teletype, we should send the following information:

1. Names of the travelers
2. Dates of the travel (closest possible approximation)
3. Mode of travel
4. Itinerary
5. Purpose of the travel
6. Agencies or persons you expect to contact

Actually the above information can be very brief and need not hamper our customary activities. If major changes in your itinerary occur while you are in Mexico, the Joint Commission should be notified by telegram, but minor changes can reported after your return to Mission.

A brief report of your activities in Mexico should be sent to the Joint Commission by teletype or air mail letter on the first day after your return. If all activities were routine, this can be very brief; for example, "Visited all fly traps along highway from Cd. Victoria to La Pesca and placed 2 new traps in Municipio Villa de Casas, Tamaulipas." Information of interest can be added, but our reports should not overlap or duplicate the reports on screwworm incidence, etc., that are gathered and submitted by the Screwworm Inspectors. We should, though, provide

Screwworm Research Laboratory
P.O. Box 986
Mission, Texas 78572

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the Commission with copies of reports, summaries or manuscripts which contain findings that were made in Mexico even though a considerable period of time may elapse before such reports are prepared.

O. H. Graham
Acting Location Leader

cc: M. E. Meadows
E. A. Taylor

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O. H. Graham
Acting Executive Leader

cc: M. E. Meadows
E. A. Taylor

1/18/74

PERSONNEL ROSTER

ANTHONY, Brenda Kay	Route 1, Box 266, Edinburg	383-1017
BAZAN, Horacio	Route 1, Box 112, Rio Grande City	487-3648
CRYSTAL, Maxwell M.	1712 Orchid, McAllen	686-0340
FUENTES, Andres	Route 1, Box 107, Edinburg	
GARCIA, Jose J.	Lynn	481-3572
GONZALEZ, Frank C.	Route 1, Box 149, Mission (Taylor Rd)	
HANDKE, Bobby D.	1101 Miller Street, Mission	
HIGHTOWER, B. G.	Apt. 707, Maryland Apt, Harlingen	425-1798 Unlisted
JESTER, Thelma V.	Route 1, Box 124, Mission (N. Shary Rd)	585-3106
JONES, Calvin M.	2004 Camellia Ave., McAllen	682-5916
LOPEZ, Erasmo	Box 25, Garciasville, Rio Grande City	487-2280
RAMIREZ, Roberto	250 S. Guerra St., Weslaco	968-7036
TURNER, John P.	RR 2, Box 360, Edinburg	383-1377

Bushland, R. C. (Collaborator)	1514 Xanthisma, McAllen	682-8724
KERRVILLE		257-3566
WESLACO	Area Director (E.A. Taylor, Juanita)	968-5913
	Asst. Area Director (Nadine)	968-8341
	Administrative Office	968-5533
POISON CENTER:	Valley Baptist Hospital	423-1224
	Emergency Room, Harlingen	Ext. 23

PERSONNEL ROSTER

ANTHONY, Brenda Kay	Route 1, Box 266, Millsburg	383-1017
BAKER, Horacio	Route 1, Box 112, Rio Grande City	
CHESTAL, Maxwell H.	1712 Orchid, McAllen	
FUENTES, Andres	Route 1, Box 107, Edinburg	
GARCIA, Jose J.	Lyon	481-1572
GONZALEZ, Frank C.	Route 1, Box 149, Mission (Taylor Rd)	
HANCOCK, Bobby D.	1101 Miller Street, Mission	
HIGHTOWER, B. G.	Apt. 717, Maryland Apt, Harlingen	
JESTES, Thelma V.	Route 1, Box 124, Mission (E. Sharp Rd)	
JONES, Calvin H.	1704 Greenlin Ave., McAllen	
LOPEZ, Ramon	Box 25, Garciasville, Rio Grande City	
SANCHEZ, Roberto	250 S. Guerra St., Weslaco	
TURNER, John F.	RR 2, Box 360, Edinburg	

Burkland, R. C. (Collaborator)	1914 Xanthian, McAllen	
KERRAVILLE		
WESLACO	Area Director (E.A. Taylor, Juanita) Asst. Area Director (Medina) Administrative Office	
POISON CENTER:	Valley Baptist Hospital Emergency Room, Harlingen	423-1224 Ext. 23

U.S. DEPARTMENT OF AGRICULTURE

REFERENCE SLIP

DATE 2/13/74

TO O. L. Graham

- [ ] ACTION
- [ ] NOTE AND RETURN
- [ ] APPROVAL
- [ ] PER PHONE CALL
- [ ] AS REQUESTED
- [ ] RECOMMENDATION
- [ ] FOR COMMENT
- [ ] REPLY FOR SIGNATURE OF
- [x] FOR INFORMATION
- [ ] RETURNED
- [ ] INITIALS
- [ ] SEE ME
- [ ] NOTE AND FILE
- [ ] YOUR SIGNATURE

REMARKS

FROM E. A. Taylor

GPO : 1964 OF—742-059

FORM AD-514 (8-64)

Edminster to Eat

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
SOUTHERN REGION
701 LOYOLA AVENUE
P. O. BOX 53326
NEW ORLEANS, LOUISIANA 70153

January 28, 1974

Subject: Screwworm Research at Mission, Texas

To: T. W. Edminster, Administrator

This is a brief summary statement of my impressions resulting from the Executive Conference on screwworm research at Mission, Texas, and a visit to the barrier zone in Mexico.

Dr. McCracken attended the Executive Conference and has material showing attendees, review material of past research, statement of the present situation on several elements of the program, and recommendations for actions prepared by Dr. Bushland, Research Leader, in consultation with scientists and Area Director, E. A. Taylor.

The scientists on this program have and are working hard, but simply do not have enough scientific facts to date to be sure of their recommendations to APHIS to improve the action program to keep the screwworm out of the United States or to eliminate it in Mexico and move the barrier to the Isthmus of Tehuantepec. As you know, in spite of great efforts to have a barrier zone in Northern Mexico, screwworm cases have occurred in Texas, Arizona, and New Mexico.

It is my opinion, based on the information received on this trip, that the efforts by APHIS and ARS have saved the cattle industry in the United States many times the cost of the program, thus providing lower costs to the consuming public than would have existed had the program not been carried out. It is certainly my opinion that the program should be continued with the best combined efforts of APHIS and ARS and the Mexican-American Joint Commission.

As you know, Dr. Bushland retired recently. Dr. Graham, who is stationed at Kerrville, has been detailed to Mission and is Acting Research Leader until the new leader reports to Mission. Dr. Graham

RECEIVED
JAN 30 1974
AREA OFFICE
WESLACO, TEXAS

has made great effort at considerable personal sacrifice and has had some disappointing experiences in two studies he set up which could not be completed through conditions over which he and his research associates had no control. I have expressed to him our personal appreciation for his dedication and efforts.

Dr. Snow has been selected as the new Research Leader for the Screwworm Research Program. Mr. Taylor will work with Dr. Graham and Dr. Snow to effect a transition in leadership of the program. As you know, we have directed extra resources to the program and will continue to do so. I feel strongly we need extra appropriated funds for this work. Hopefully, Congress will appropriate increased funds in FY 75 which can be used to increase the effort on the research aspects of the screwworm program.

Some immediate steps are being taken to try to help APHIS locate engineering talent to consult on some of the processes on the screwworm rearing plant. We expect to have a chemical engineer and an agricultural engineer visit with Dr. Meadows and his staff and Dr. Graham and his staff this week.

We have outlined a number of areas in which new technology is needed to improve the action program. We have discussed several approaches. Mr. Taylor has agreed to work with Dr. Henderson to put these in report form.

Dr. Snow attended the conference and has some definite ideas as to research approaches to gain needed technology. He will work with Mr. Taylor and the research staff to develop these and implement them as rapidly as possible. He will, of course, work very closely with Dr. Meadows and his staff so that the ARS program will be of maximum benefit to the APHIS action program.

It was my impression that we have good working relationships between APHIS and ARS. We need to continue to make every effort to have good communications between APHIS and ARS. It is essential for the maximum effort that when evaluation of the released flies is being made that ARS and APHIS plan together and that the employees of both agencies carry through so that conclusive data can be obtained.

The sterile screwworm fly program has not been as effective the past two years as had been hoped. If we can effect the planned increased research effort, I believe that we can get enough scientific facts to help APHIS make the program effective and to help the Mexican-American Joint Commission have an effective program in Mexico.

A. W. Cooper

A. W. Cooper
Deputy Administrator

0116

Screwworm Research Laboratory
P. O. Box 986
Mission, Texas 78572

February 5, 1974

Subject: Screwworm Research in Mexico Under Cooperative Agreement with Monterrey Institute of Technology

To: E. A. Taylor, Area Director
Subtropical Texas Area
USDA, ARS, SR
Weslaco, Texas 78596

For your information, and for the record, Dr. Hightower and I discussed plans for their research on screwworm ecology with Dr. Dieter Enkerlin and associates yesterday afternoon. It was agreed that Mr. Melis will move from Sonora to Tamaulipas in the near future and will undertake an intensive study of screwworm ecology in a single canyon (or mountain valley) on the eastern slope of the Sierra Madre Oriental somewhere between Cd. Victoria and Monterrey. There are several valleys which would be suitable, but Dr. Enkerlin is especially interested in Canon El Novillo, west of Cd. Victoria, where Calvin Jones trapped unusually large numbers of wild flies last year.

We also discussed the new OAS-sponsored Institute of Tropical Agriculture in Chiapas with which Dr. Enkerlin and Monterrey Tech will be associated. Neither APHIS nor ARS has any information on the ecology of screwworms in southern Mexico, but such knowledge will be vitally important to the Mexican eradication program. The proposed ARS screwworm laboratory in Chiapas could contribute in this study, but if extramural funds will be used to augment screwworm research this fiscal year as Dr. McCracken suggested on January 23, we should perhaps consider an expansion of our cooperative agreement with Monterrey Tech. Dr. Enkerlin already has an entomologist in Chiapas and hopes to have a laboratory facility there later this year.

In comparing the relative merits of extramural research on screwworm behavior and ecology by Monterrey Tech, INIA, and The University of Texas, I favor increased use of Monterrey Tech. Our relationship with INIA is currently complicated by our obligation to support NASA and the frequent direct contacts between NASA and INIA. I have misgivings about Dr. Guy Bush's proposal to send teams of people to Mexico to study screwworm behavior in the field. Undoubtedly his team has important skills in

population genetics, but this does not mean that they are the best qualified group to study screwworm behavior in the field in Mexico.

Of the many possible uses of extramural funds to support screwworm research, I feel that the addition of $30,000 to $50,000 to our coop agreement with Monterrey Tech would be the best move we could make at this time.

O. H. Graham
Acting Research Leader

E. A. Taylor February 5, 1974

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C. H. Graham
Acting Research Leader

OHG

OHG

Screwworm Research Laboratory
P. O. Box 986
Mission, Texas 78572

February 5, 1974

Subject: Use of Added Funds Being Supplied by Southern Region

To: E. A. Taylor
Area Director
Subtropical Texas Area, USDA, ARS, SR
Weslaco, Texas 78596

In telephone conversation yesterday, you asked for an estimated breakdown of the $25,000 which Dr. Cooper indicated he would add to screwworm research funds so that Strain A can be reared on a large scale and field tested this spring. If accepted for use in the APHIS eradication program, Strain A could then be reared indefinitely in the same facility at a level that would permit ARS to deliver 1,000,000 eggs to APHIS each day.

The added funds would be used as follows:

Equipment	7,695.00
Building Materials	3,500.00
Building Modification Temporary labor	4,480.00
Expendable supplies for screwworm rearing	6,000.00
Travel Cost--Field Testing of Strain A, 4th Qtr FY 74	3,325.00
TOTAL	25,000.00

O. H. Graham
Acting Research Leader

Screwworm Research Laboratory
P. O. Box 1430
Mission, Texas 78572

February 5, 1974

Subject: Use of Wood-Chute Boxes Supplied by Southern Region

To: L. A. Taylor
Area Director
Subtropical Texas Area, USDA, ARS, SR
Weslaco, Texas 78596

In telephone conversation yesterday, you asked for an estimate of the cost of the Wood-Chute Boxes Cooper Laboratory supplied to Southern Region so that Screwworm Adults can be reared on a large scale and flown to Puerto Rico. It is assumed that the USDA ARS Screwworm Laboratory there could be reared similarly in the same facility as Texas would permit ARS to deliver 1,000,000 eggs to APHIS each day.

The cost data would be used as follows:

Equipment

Building Materials

Building Modification
Temporary Labor

Expendable supplies for operation & maintenance

Annual Operating Costs

Annual Screwing Costs

You are invited to attend

festivities honoring employees of the

Screwworm Eradication Program

February 21, 1974 *Mission, Texas*

Dedication of Husman Irradiator *2:00 p.m.*

Employee Bar-B-Q *7: 00p.m.*

Catholic War Veterans Hall

Mayberry and Expressway

Mission, Texas

Guest Speakers: *Dr. Frank Mulhern,*

Administrator, **APHIS**

Mr. C. G. Scruggs,
SWAHRF

Southwest Animal Health Research

Foundation

R. S. V. P.

LIVESTOCK INSPECTORS MEETING
Wednesday Feb.20, 1974
1:00 P.M.

INTRODUCTION OF PARTICIPANTS (Introduccion de participantes)	Smith & Anderson
THE SHARMAN REPORT (El informe Sharman)	Anderson
THE CURRENT SCREWWORM SITUATION (La situacion presente del Gusano Barrenador)	Smith & Anderson
ACCELERATING CASE REPORTAL FROM THE FIELD (Apresurando el reportaje de muestras en el campo)	Group Discussion (Discusion oral)
A STANDARD SYSTEM FOR REPORTING UNTREATED CASES (Un sistema corriente para el informe sobre los casos que no se han tratado)	Group Discussion (Discusion oral)
PATTERNS OF SCREWWORM MIGRATION (El movimiento del Gusano Barrenador)	Group Discussion

Thursday Feb. 21, 1974
8:00 AM - 4:00 PM

HOTSPOT MARKING IN THE FIELD (Senalando los casos en el campo)	Brown, Garcia, Zapata & Stubblefield
AERIAL OBSERVATION OF HOTSPOTS (Observacion aereo de los casos)	Pilots
PLANT TOURS (Visitas dentro de la Planta)	Morning & Afternoon
SCREWWORM IDENTIFICATION (Identificacion de muestras)	Ruth McLaughlin

Subject: Comparison between the Tex-Mex and the newly developed ARS strain

February 25, 1974

To:
Dr. Marco A. Villasenor
Dr. Norvan L. Meyer
Animal and Plant Health Inspection Service
USDA, VS
Liebnitz 20, Col. Anzures
Apartado Postal M-2890
Mexico 5, D. F.

A test is presently being planned to compare the relative field competitiveness of the Tex-Mex and ARS (Strain A) strains of flies. The test which is planned will determine which of the two strains will be used later for mass production by APHIS. It is essential that this test be conducted because it is the only method which we have available to us which will test the ultimate effectiveness of a new strain of flies.

The two strains of flies which will be used are at the following stages. The Tex-Mex strain is now in mass production by the APHIS production plant. It consists of two general genetic stocks, one of which was derived from 18 localities in Texas, the other from 6 localities in Mexico. The Texas material was collected in late summer of 1972 and has been in domestication since this time. The Mexican material was collected in winter of 1973 and combined with the Texas material at that time and is therefore over a year old from the original genetic stock. It is suspected that considerable inbreeding has occurred during this time period.

The strain which will be tested will be termed "A" strain and has the following general genetic background: The Texas portion has been derived from 29 localities in South Texas (collected in late summer of 1973) while the Mexican portion consists of 66 separate genetic sources. All of the crosses necessary for this strain are now complete and the strain is being increased to the point that, by April, ARS should be capable of producing 3 million flies a week for release. At this time we will want to take it to the field for release.

Both strains will be reared using nutria meat and will be handled under identical conditions. They will be delivered by plant aircraft to Tampico and dropped in their respective test areas. To insure that the strains are delivered and dropped in their designated zones, they will be dyed separate colors using Day-Glo fluorescent powder and be marked by using regular release boxes which have been constructed inside out. Delivery will be made once a week to areas south of Tampico. All packaging will be done at the mission plant.

The area which has tentatively been selected for the test is a 6000 square mile block running from the 21° to the 22° parallel and from the coast to the Sierra Madre Oriental Mountains. This area will be broken on a central North-South line into two tracts consisting of a 3000 quare mile area; however, this is subject to change depending upon the level of infestation which is present. Two towns have been selected as base centers because of their central location. These are Tempoal and Naranjos, both in Northern Vera Cruz. We anticipate that the people of ARS will headquarter in one area while those of APHIS will headquarter in another, thereby reducing the logistics of servicing the two test areas.

Two methods will be used to sample the populations. These will be fly traps for adult population sampling and sheep pens for egg mass sampling. We anticipate that a minimum of 20 traps will be set within each test area. They will be liver-baited (it is possible that artificial lures may also be used) and checked at weekly intervals. We have not determined how many sheep pens will be built, but will determine the number in respect to the relative wild population. We feel that for adequate sampling, a minimum number of egg masses collected per week should be no less than 50.

If cooperative ranchers are available and enough manpower is available, egg masses may be collected from livestock. We feel that a 6-8 week time period is a minimum period for data collection; however, this will depend on the degree of infestation.

The egg masses which are collected will be scored in Mexico and the resulting larvae possibly sent to Mission for colonization and electrophoritic examination. Some of the egg masses may be used for animal infestation to help supplement the eggs from Mission used for infestation. The flies which are recaptured will be killed, dried and returned to Mission for sorting; however, some material may be sorted depending on time available to the workers. All reporting will be done on a weekly basis and the information reported to Dr. M. E. Meadows, Dr. Floyd Smith, and Dr. O. H. Graham and myself.

Dr. Marco A. Villasenor
Dr. Norman L. Meyer

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We would like to request the following assistance from the Joint Mexico-American Commission for the operation of this test:

1. The block of land described in this letter or a block of similar size if there is not a sufficient level of screwworm infestation available for testing by April 1, 1974.

2. A thorough investigation of the incidence of infestation within this area prior to April 1. We feel that it would be desirable to have this phase conducted by personnel who are familiar with the area and know some of the ranchers. While these inspectors are checking for infestations we would like them also to begin acquiring sheep whenever possible.

3. Assignment of some livestock inspectors or personnel to assist in operation of the sheep pens and fly traps by April 1, 1974. It would be preferable if each individual were assigned a vehicle as we are short not only of personnel but also vehicles. With regard to the vehicles, we also would like to request that the vehicles have or will be issued permanent entry papers so that they may enter and leave Mexico as needed. (We do not anticipate that the trucks will have to leave Mexico; however, if it becomes necessary to transport large items or equipment into Mexico we would like to have this capability available).

Both ARS AND APHIS from Mission will each supply one vehicle for use during this study. We, as a group, will also supply at least two professionals or technicians who have had training and experience necessary for the operation of the test.

4. The right to acquire local help to also assist in handling and feeding the sheep.

5. We would also like to request the commission's assistance to help in obtaining a free entry permit from Aduana so that small items of little value and an expendable nature can be brought into Mexico as needed.

We have not gone into great detail but merely outline the approach to data gathering. If more specific information is needed we would be happy to elaborate on any or all of the above description. Thank you for considerations.

We would like to request the following assistance from the Joint Mexico-American Commission for the operation of this test:

1. The block of land described in this letter or a block of similar size if there is not a sufficient level of screwworm infestation available for testing by April 1, 1976.

2. A thorough investigation of the incidence of infestation within this area prior to April 1. We feel that it would be desirable to have this phase conducted by personnel who are familiar with the area and know some of the ranchers. While these inspectors are checking for infestations we would like them also to begin acquiring sheep whenever possible.

3. Assignment of some livestock inspectors or personnel to assist in operation of the sheep pens and fly traps by April 1, 1976. It would be preferable if each individual were assigned a vehicle as we are short not only of personnel but also vehicles. With regard to the vehicles, we also would like to request that the vehicles have or will be issued permanent entry papers so that they may enter and leave Mexico as needed. (We do not anticipate that the trucks will have to leave Mexico; however, if it becomes necessary to transport large items or equipment into Mexico we would like to have this capability available).

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We have not gone into great detail but merely outline the approach to date gathering. If more specific information is needed we would be happy to elaborate on any or all of the above description.
Thank you for consideration.

Harold C. Hofmann, PhD.
Entomologist in Charge
Methods Development Section
Animal Health

CC Dr. M. E. Meadows
Dr. O. H. Graham
Dr. Floyd Smith

Dr. Marco A. Villaseñor
Dr. Norman L. Meyer

Harold C. Hofmann, PhD.
Entomologist in Charge
Methods Development Section
Animal Health

CC Dr. M. E. Meadows
Dr. O. H. Graham
Dr. Floyd Smith

PROPOSAL FOR TESTING ASSORTIVE MATING AMONG SCREWWORMS IN NORTHERN AND SOUTHERN MEXI

During the past two years there has been considerable speculation based on the hypothesis that wild screwworm flies might have become resistant to sterile release screwworm flies. This speculation is not without foundation, for it is known that many insects have become resistant to the various insecticides. Some of this resistance was selected through changes in behavior as was the case in codling moth resistance to arsenate insecticides. Other insects have developed resistance through selection of metabolic detoxification as was the case for DDT resistance. There are also many examples in which Drosophila have been subjected to selective pressures and have developed a system of selective mating within a single population. ~~It is~~ Some authors feel that it is therefore reasonable to suppose that, with all the selective pressure we have applied to wild screwworms with our sterile release of flies in the past 12 years ~~that~~ we have selected a population which evolved systems that allow a preponderance of wild (x) wild matings.

There is even more reason to wonder if this has occurred because of the program's failure to control screwworms in Texas in 1972 and in south Texas in 1973.

Because of the importance of the screwworm program to the Texas livestock industry and because a new program is about to commence in Mexico, it is essential to determine if this evolution has occurred. If it is found that wild screwworms have evolved systems to selectively mate, then it will be essential to investigate and determine the factors involved so that corrective measures can be taken (with our present program). It will be essential also to direct strategies so that this will not occur during the Mexican program.

There are two methods of determining if assortive mating is occurring.

The first is the degree of program success during the 1974 screwworm season in Texas and northern Mexico; however, this evaluation should be limited to a year in which normal or average precipitation patterns prevail. If the program can successfully keep screwworms from reaching outbreak proportions during this upcoming period, it will strongly suggest that our released fly can successfully compete in the wild population; however, if we are unable to control screwworms under this limitation of climatic conditions it will strongly suggest a wild population of screwworms has evolved which is not randomly mating with our released flies. While this information may be the most easily obtained and perhaps the most valid method of testing this hypothesis, it will require a full year to generate the data; therefore, a second method of testing is being proposed. This test is outlined below.

Two separated sites, each with a measurable degree of infestation will be established. One site (test site) will be located south of any area which has not been continuously exposed to released sterile flies. The second site (control site) will be located within the barrier zone and will continue to be exposed to release flies, thus becoming the control for comparison. It should be expected that if selective mating is occurring it can be determined by comparing the results of the two sites.

Both areas will be dropped with dye-marked flies at an initial rate of 2000 flies per square mile and the ratio of wild to released flies will be determined by recovery of flies from liver-baited traps. In addition to the fly traps, within each area animal pens will be established to collect egg masses so that the level of egg mass sterility can be determined in both areas. From this information a competitiveness factor will be determined when the two areas are compared.

If there is a high degree of competitiveness of our flies in the test zone and a low degree in the control zone, it will strongly suggest that assortive mating is occurring; however, if both zones show a low degree of sterility then other factors could be involved.

STATUS OF TEST

The two areas which have tentively been selected are ~~Between~~ Tuxpan and Vera Cruz for the test area and North of Tampico in the Soto La Marina area for the control. AT the present time Mexican inspectors are in these areas gathering information as to the Levels of infestation, availability of pens sites as well as animals. A List of equipment is being prepared and the logistics determined. ~~Also, communication~~ matters are being handled with the with Mexico ~~Estabished~~ program, With the cooperation of the Joint Mexican Program. This Test can be preformed without jeopardizing our present activities however, without their direct support, All our present activities will have to cease in order ~~for us~~ to conduct the test. ~~Done.~~

~~Additional Troops are being constucted i~~

~~Arrangements to have test~~ design reviewed by ~~Stations~~

~~in writing before~~ in writing & elsewhere

Test Area in Mexico

1) People — 1-Mission
1-Mexico
1-Local
} For each Test Zone

2) Vehicle — 3 pickups For each Area

3) Essential To have full support from Mission distribution To Transport people and Supplies

4) Supplies
A- Fence Materials
B. Feed Troughs ; Water Tubs
C. Sheaves, Scaples, Syringes etc.
D. Two Scopes

5) Liver Storage Area in each Test Zone

6) Ten Traps / Area
15

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
VETERINARY SERVICES
SCREWWORM ERADICATION PROGRAM
POST OFFICE BOX 969
MISSION, TEXAS 78572

Subject: Weekly Activity Report
March 1 - March 7, 1974

March 13, 1974

To: Dr. M. E. Meadows, Jr.
Area Veterinarian in Charge
Animal Health

Experiments were begun that were designed to reveal assortative mating behavior in field material from south of the barrier zone. Screwworm flies, collected as mature larvae from 6 naturally infested animals in Tuxpan, Vera Cruz, were sexed at eclosion and aged 4 days. Samples of the current production fly, "Tex-Mex", were similarly treated. Flies of opposite sex were caged together, 3 males to 30 females, in transparent observation chambers, and the number of mating attempts and successful copulations recorded over one-hour observation periods. Four tests, tabulated below, were made simultaneously and are unremarkable except for the fact that wild flies clearly were reluctant to mate in plastic cages with homologous or heterologous types. Wild females accepted fewer copulations from the sexually aggressive "Tex-Mex" males than did the "Tex-Mex" females, but the difference could be ascribed to chance alone ($x^2 = 3.67$, $0.05 < P < 0.10$). Replications will be made as field material becomes available.

Cross Male x Female	No. Attempts	No. Matings	Total
Tex-Mex x Tex-Mex	43	22	65
Tex-Mex x Wild	64	11	75
Wild x Wild	9	2	11
Wild x Wild	9	4	13

Strong pressure has been put upon APHIS and ARS to test, in Mexican field trials, the hypothesis that assortative mating behavior has developed in the barrier zone and north of it, but not in the "unchallenged" fly populations of Mexico south of the barrier zone. An experimental design, widely advertised within government circles, has been advocated as a method to test the hypothesis. The likelihood of the hypothesis can be simulated using computerized models and this work nearly is complete.

If it is shown that assortative mating behavior, due to a pre-copulatory isolating mechanism, is unlikely to develop under the most liberal possible assumptions, then the likelihood of the hypothesis would become much less under more stringent assumptions. Wild screwworm populations have been challenged in the southwest for a ten-year period previous to the 1972 epidemic, and genes conferring sexual isolation in wild flies would have to achieve a high frequency within that span of time, say 70-100 generations. Further, immigration from unchallenged southern populations would have to be recognized. The models tested postulate that "recognition" of mass-produced, sterile flies by wild females is conferred by a single gene--dominant, incompletely dominant, or recessive--at specified frequencies in the original, unselected populations. Selective coefficients of less fit genotypes are assumed and various rates of immigration from unselected southern populations are recognized.

The possibilities of recognizing assortative mating behavior in a field trial must also be assessed in terms of the likelihood of rejecting a true hypothesis or accepting a false one. We are asked to challenge two widely separated populations of screwworm flies with the current production strain. The hypothesis that assortative mating may be occurring would be accepted if the competitiveness of sterile flies appeared to be greater against the southern population. Small changes in ratios of adult sterile to wild flies and ratios of sterile to fertile egg masses give large changes in estimated values of competitiveness (graphs illustrating this have been prepared). The consequence is that only a limited amount of confidence can be placed in the paramter of competitiveness, and its variance badly needs to be derived. The occurrence of frequency-dependent and/or density-dependent mating would make comparison of two (or more) competitiveness estimates a seriously questionable procedure. (It is worth noting that either one of these phenomena, should they occur, might explain "resistance" of screwworm populations to challenge by sterile flies.) Until measurements can be made to determine if sterile males are equally effective in mating over all probable relative frequencies of sterile to wild flies, field trials designed quantitatively to estimate competitiveness should be carried out when target populations are of approximately equal magnitude and ratios of sterile to wild flies approximately equal.

The results of the computer simulations and plots of "competitiveness" at serial ratios of sterile to wild adults and sterile to fertile egg masses will be reported in suitable form.

Elliot S. Krafsur

Elliot S. Krafsur, PhD.
Entomologist
Methods Development Section
Animal Health

Enclosures
Quality Control Data
Larvae weight

notes on Joyce DeVaney's mss. on colonization of various strains of screwworm flies.

U.S. DEPARTMENT OF AGRICULTURE | DATE

REFERENCE SLIP

TO

- [ ] ACTION
- [ ] APPROVAL
- [ ] AS REQUESTED
- [ ] FOR COMMENT
- [ ] FOR INFORMATION
- [ ] INITIALS
- [ ] NOTE AND FILE
- [ ] NOTE AND RETURN
- [ ] PER PHONE CALL
- [ ] RECOMMENDATION
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REMARKS

FROM

GPO : 1964 OF—742-059

FORM **AD-514** (8-64)

U.S. DEPARTMENT OF AGRICULTURE

REFERENCE SLIP

DATE 31 Jan. 74

TO

Dr. Buckland

Dr. Jordan

Dr. Hirschmann

- [ ] ACTION
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REMARKS Dr. Jordan asked me to review the records of this project. I would appreciate your comments.

See over

FROM

BZH

2/7/74

I think you have been served in your comments.

I don't believe that the paper will advance the cause of ARS, snowroom work, or be of much interest to enthusiasts.

Some experiments might be alright at the time they're conducted but not all have to be published.

RCB

U.S. DEPARTMENT OF AGRICULTURE

REFERENCE SLIP

DATE 1-31-74

TO Bill Hightower

- [ ] ACTION
- [ ] APPROVAL
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- [ ] FOR COMMENT
- [ ] FOR INFORMATION
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- [ ] RETURNED
- [ ] SEE ME
- [ ] YOUR SIGNATURE

REMARKS Please review as a peer reviewer, ~~&~~ refer to others as you see fit & return to me.

No change in my original comment BBH

Hugh

FROM

GPO : 1964 OF—742-059

FORM AD-514 (8-64)

2/28

Hugh:

I can see no major objection to recommending that Joyce's paper be published. Neither do I see any adverse effects on USDA. The length of the paper is perhaps out of proportion to the research contribution. It might be shortened to a research note, & such a step might satisfy Bushland & Hightower.

In the introduction, some readers might wonder why the Florida strain was replaced since the resistance was declared eradicated from the Southwest. The phrase "variable field conditions" & especially "variable resistance control results" are nebulous. It might be better to omit the first 2 lines of paragraph 2 up to the comma.

In Materials & Methods, I question the designation of "substrain" to distinguish the populations reared on different larval diets.

Mel

2-26-74

Mel -

you are probably already somewhat familiar with this mss. (See handwritten comments on Joyce DeVaney's memo of May 16, 1973 and your memo to Joyce dated June 21 -

Subsequently Joyce revised the original mss. and Bob Harris and Bob Hoffman feel that all objectionable statements have been deleted or reworded - However, Hightower and Bushland still do not feel that it is worthy of publication. On the other hand, Chris Hofman says that he does not feel that APHIS would be hurt by any of Joyce's statements -

What is your opinion of the revised mss -

a. scientific merit?

b. effect on USDA programs?

(We know that university scientists have been & will continue to be hypercritical of USDA large scale control & eradication programs. We do not want to suppress research findings but we do need to be sure of results that are presented for publication)

Another aspect is that this mss. and your recent one will probably reach NTE at about the same time.

Hugh

Summary of Egg mass Data

March 1 - 31, 1973

From castrated cattle, all locations:

Sterile egg masses — 15
Fertile egg masses — 12
Found larvae but no eggs — 16

Percent sterility — 35

From sheep pens, all locations:

Sterile egg masses — 14
Fertile egg masses — 6
Found larvae but no eggs — 0

Percent sterility — 70

Combined, percent sterility — 29/63 = 46

March 21 - April 1, 1973 — 11 days

From castrated cattle, all locations:

Sterile egg masses — 13
Fertile egg masses — 3
Worm cases — 2

Percent sterility — 72

From sheep pens, all locations:

Sterile egg masses — 7
Fertile egg masses — 0
Found larvae, but no eggs — 0

Percent sterility — 100

Combined, percent sterility 20/25 = 80

Summary of Egg Mass Data

March 21 - April 7 incl. - 17 days

From castrated cattle (except Soto La Marina)

Sterile egg masses	-	16
Fertile egg masses	-	3
Worm cases	-	7
Percent sterility	-	62

From sheep pens, all locations

Sterile egg masses	—	13
Fertile egg masses	—	3
Percent sterility	-	81

Combined -

Sterile	29
Fertile	13
Total	42

Overall percent sterility — 69

Summary of Egg Mass Data

March 21 – April 15 incl – 25 days

From castrated cattle (incomplete for Soto la Marina) (30)

Sterile egg masses	18
Fertile egg masses	4
Worm cases	8
Percent sterility –	60

From sheep pens, all locations (21)

Sterile egg masses	17
Fertile egg masses	4
Percent sterility –	81

Combined –

Sterile	35
Fertile	16
Total	51

Overall percent sterility – 69

OHG

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
SOUTHERN REGION
U. S. Livestock Insects Laboratory
P. O. Box 232
Kerrville, Texas 78028

March 25, 1974

Subject: Manuscript "Longevity, Oviposition, and Fertility of Several Strains of Screwworm Flies" by Joyce A. DeVaney and Jose J. Garcia

To: Joyce A. DeVaney, Research Entomologist
Livestock Entomology Unit, VTERL
College Station, Texas

As I mentioned on the telephone last week, your revised manuscript has been reviewed by several ARS and APHIS entomologists at Mission. A peer review by Dr. Hightower is enclosed, but the others did not provide peer reviews. They could, however, if you need other peer review forms to go with the manuscript.

Dr. Bushland was frankly concerned that publication of your paper might provide critics of the eradication program with information that would be distorted to support their viewpoint. As you know, some of the outside criticism has been biased and quite unfair; many geneticists and other biologists apparently feel that the program is doomed to failure because their universities have not received Federal funds to subsidize extensive basic research on the screwworm and other species. Others at Mission do not believe that publication of your data will encourage prejudicial criticism.

It appears to me that your manuscript is worthy of publication. Brevity is the key to acceptance by ESA journals these days so you should condense as much as possible. It should be made quite clear that tests such as these do not provide any information about the suitability of any strain for use in the APHIS mass rearing and release program.

O. H. Graham
Research Entomologist

Enclosures

cc:
J. W. Snow

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
SOUTHERN REGION
VETERINARY TOXICOLOGY AND ENTOMOLOGY RESEARCH LABORATORY
P. O. DRAWER GE
COLLEGE STATION, TEXAS 77840

RECEIVED
JAN 31 A.M.

January 29, 1974

Subject: Manuscript: "Longevity, Oviposition, and Fertility of Several Strains of Screwworm Flies" by Joyce A. DeVaney and Jose J. Garcia

To: O. H. Graham
Mission, Texas

As discussed in our phone conversation this morning I am sending the above re-written manuscript along with the edited copy for your consideration. I would appreciate your reviewing it as a peer reviewer and as Research Leader for the screwworm laboratory.

Joyce A. DeVaney
Research Entomologist

Enclosure

Extra

P. O. Box 232
Kerrville, Texas 78028

April 12, 1974

Subject: Memorandum on Screwworm Research by D. E. Hopkins

To: J. Wendell Snow, Research Leader
Screwworm Research Laboratory
USDA, ARS
Mission, Texas 78572

During our discussion of this subject yesterday, you asked that I make a few comments in writing so that they would be on file with the original. Mr. Hopkins' memo, dated April 9, 1974, is both interesting and provocative. His observations on the Puerto Rican program were the only serious attempt by ARS to find out what was happening in the field, and it is obvious that anyone who is interested in the Mexican eradication program should assess the problems and difficulties that occurred in Puerto Rico and attempt to learn from them. I am not convinced that the screwworm on Puerto Rico is a radically different animal from the one in the United States and Mexico, but Mr. Hopkins' ideas on the need for field studies in advance are sound and I strongly agree with his recommendations for research that would produce scientifically sound data that could be used as a basis for making the major technical decisions which will determine success or failure of the program in Mexico. I do disagree with Mr. Hopkins on some of the details of the reasoning on which his conclusions are based. The following comments are numbered to correspond to his numbered conclusions:

1. True. However, this does not mean that screwworm populations do not fluctuate in the tropics nor that weather has no effect on the fluctuations. The hot, dry weather associated with dry season is probably just as restrictive on screwworm reproduction as Texas winters. In very wet areas, the mortality of screwworm pupae is probably very high during seasons when the soil is highly saturated with water. Natural enemies such as fungi are probably assisted by prolonged periods of high humidity.

2. The need to study and delineate the factors which control populations in tropical Mexico is obvious. These factors are not necessarily more numerous or subtle than the corresponding factors in northern Mexico and the southwestern United States.

3. It is true that a 70% sterility rate would not cause populations to decline if at that time the rate of increase was 4 X or more per generation. It is also true, however, that no species can continuously quadruple its numbers over a prolonged period of time. In the screwworm, as in any other species, periods of very high reproduction are off-set by other periods in which populations decline or remain more or less stable.

4. In most areas of Mexico, sterile male releases can be supplemented with other means of screwworm control. Only in areas of very rugged terrain will it be necessary to rely on sterile male releases alone. In general, livestock are controlled much closer in Mexico than in the United States, and the number of full-grown screwworm larvae produced by "neglected" domestic animals is apparently much lower per 1000 susceptible animals than in the U. S.

The above remarks are intended to supplement, not contradict, what Mr. Hopkins has said. His over-all conclusions are completely valid, and it would be impossible to over-emphasize the importance of undertaking the research in the field that he is recommending, and obtaining and publishing data which will improve our understanding of screwworm behavior in nature and screwworm populations in Mexico. Both ARS and APHIS are blessed with a super-abundance of armchair screwworm experts, who are always ready to meet, confer, and eloquently recommend, but are never available to go to the field and undertake the many days and weeks of tedious and frustrating study that must be done if the Mexico program is to be more successful than the Puerto Rican. It is to Mr. Hopkins everlasting credit that he, all by himself, made almost 100% of the scientific effort in Puerto Rico under very trying conditions and that he is sufficiently thoughtful and concerned about future programs to summarize the information he obtained and present it in the form of recommendations for improving the research support of the Mexican program.

In general, the 3 suggested techniques (see enclosure to Hopkins' memo 4/9/74) appear to be sound and should be undertaken. However, some modification and improvisation will be needed to adapt the techniques for use in a particular region of Mexico. For example, the egg deposition rate will probably not be an absolute function of wild fly populations but will be influenced by a number of environmental factors. Extensive randomization will probably be needed to reduce the influence of these outside factors to tolerable levels.

replication

3. It is true that a 70% sterility rate would not cause populations to decline if at that time the rate of increase was 6 X or more per generation. It is also true, however, that no species can continuously quadruple its numbers over a prolonged period of time. In the screwworm, as in any other species, periods of very high reproduction are offset by other periods in which populations decline or remain more or less stable.

4. In most areas of Mexico, sterile male releases can be supplemented with other means of screwworm control. Only in areas of very rugged terrain will it be necessary to rely on sterile male releases alone. In general, livestock are controlled much closer in Mexico than in the United States, and the number of full-grown screwworm larvae produced by "neglected" domestic animals is apparently much lower per 1000 susceptible animals than in the U. S.

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Release of partially sterile males will almost certainly be politically unacceptable and probably scientifically undesirable. This does not detract from the urgent need for a test procedure in which 2 strains of sterile screwworms are released simultaneously in one area. At present we have no means of distinguishing between field collected egg masses whose fertility is controlled by males of more than one strain (other than the method suggested by Mr. Hopkins), but modern technology should, with a reasonable effort, supply this tool rather quickly. Also, recent progress in the attractants research offers promise that more efficient and more extensive trapping would make the collection of adult flies more meaningful than collection of egg masses (capture of wild living females, check spermathecae for dyed seminal fluid?). Such research deserves a higher priority in your research program than the field tests that you inherited upon your arrival at Mission.

O. H. Graham
Research Entomologist

cc: J. L. Hourrigan
J. R. Johnston
E. A. Taylor
R. C. Bushland
D. L. Williams
R. O. Drummond
D. E. Hopkins

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O. H. Graham
Research Entomologist

cc: J. L. Bourgeau
J. R. Johnston
E. A. Taylor
R. C. Bushland
D. L. Williams
E. O. Drummond
D. E. Hopkins

Dr. Graham

P. O. Box 232
Kerrville, Texas 78028

April 9, 1974

Subject: Thoughts on Screwworm Research

To: J. Wendel Snow, Research Leader
Screwworm Research Laboratory
USDA, ARS
Mission, Texas 78572

Through: R. O. Drummond, Location and Research Leader
U. S. Livestock Insects Lab

Some ideas of mine are expressed in this memorandum and in some suggested research techniques which are enclosed. They are respectfully submitted with the hope that they may prove useful to those committed to the eradication of screwworms in Mexico.

During the years of 1972 and 1973, I worked on screwworm projects in and around Puerto Rico for a total of 5 months or more. I collected egg-mass data and assisted in other limited research in support of the screwworm eradication effort in progress in that area. While there, and since returning, I wondered many times why the program in Puerto Rico did not meet with the same success that the programs in Florida and Texas did. No definite answers have been forthcoming, but when the data are studied and when observations are recalled, several factors seem to stand out and to lead to the following broad conclusions. (Although some of the conclusions are self-evident, they are important enough to be stated and should receive consideration when the eradication of any well established screwworm infestation is an objective.):

1. Tropical areas differ from subtropical areas in that screwworm populations in the tropics are rarely killed because of weather changes. Usually fly populations are killed each year in subtropical zones because of freezing temperatures. Therefore, tactics and strategies for using sterile males to control or eradicate populations of screwworms in the two zones will likely differ necessarily.

2. The factors involved in using sterile males to eradicate a population that is well established are more numerous and more subtle than those involved in using sterile males to prevent the reinfestation of an area.

P. O. Box 232
Kerrville, Texas 78028

April 9, 1974

Subject: Thoughts on Screwworm Research

To: 1. Wendel Snow, Research Leader
Screwworm Research Laboratory
USDA, ARS
Mission, Texas 78572

Through: R. O. Drummond, Location and Research Leader
U. S. Livestock Insects Lab

Some ideas of mine are expressed in this memorandum and in some suggested research techniques which are enclosed. They are respectfully submitted with the hope that they may prove useful to those committed to the eradication of screwworms in Mexico.

During the years of 1972 and 1973, I worked on screwworm projects in and around Puerto Rico for a total of 5 months or more. I collected egg-mass data and assisted in other limited research in support of the screwworm eradication effort in progress in that area. While there, and since returning, I wondered many times why the program in Puerto Rico did not meet with the same success that the programs in Florida and Texas did. No definite answers have been forthcoming, but when the data are studied and when observations are recalled, several factors seem to stand out and to lead to the following broad conclusions. (Although some of the conclusions are self-evident, they are important enough to be stated and should receive consideration when the eradication of any well established screwworm infestation is an objective.):

1. Tropical areas differ from subtropical areas in that screwworm populations in the tropics are rarely killed because of weather changes. Usually fly populations are killed each year in subtropical zones because of freezing temperatures. Therefore, tactics and strategies for using sterile males to control or eradicate populations of screwworms in the two zones will likely differ necessarily.

2. The factors involved in using sterile males to eradicate a population that is well established are more numerous and more subtle than those involved in using sterile males to prevent the reinfestation of an area.

3. A relatively high sterility rate (even 70% or more) can occur in an area and still not cause a reduction in the reproductive potential of an indigenous screwworm population (this was demonstrated by data collected at length in Puerto Rico). Theoretically, reduction in productivity would not occur any time the egg-mass deposition rate was so high that, even though a relatively high sterility rate prevailed, fertile masses were still deposited on the usual proportion of naturally occurring potential screwworm wounds. (This, I believe, is a principle that established itself in Puerto Rico and should influence the planning and the execution of all programs involving areas where long-established populations exist.)

4. If eradication is desired in a given area and data show that the amount of sterile screwworm flies allotted to that area would not reduce the reproductive potential of the native flies, then additional means of control should be employed. Otherwise, natural forces such as drought or cold weather would have to be counted upon to alter the situation.

I was on the sterile screwworm project at its beginning in Kerrville, Texas, in Florida during the Curacao test, and at Mission when the laboratory there was established. Also, I have enjoyed being called back to assist in Texas, Puerto Rico, and Mexico at various times during the past several years. I suppose that this long association with screwworms is the main reason that I have taken the liberty of sending you this memorandum and the accompanying research suggestions. But also, I have spent many days in the tropics, actually collecting data and making observations, and because of this I wanted to at least offer some thoughts that seemed to be important. Problems very similar to those that were encountered in Puerto Rico are likely to be encountered in Mexico.

Because of the large amount of resource involved and because of the keen scientific interest, it is incumbent upon the USDA to collect definitive and publishable data that will clearly indicate such things as the importance of strain and what impact various release rates have on various population densities. Win, lose, or draw in Mexico, ARS or APHIS should leave a legacy of useful and valid data so that we and later workers will have an understanding of the situation.

Again, I hope this memorandum and the suggested techniques are of some use. In any event, I count the sending of them as an opportunity to express to you and to others what seem to me to be some practical lessons that were learned in Puerto Rico.

D. E. Hopkins
Biological Laboratory Technician

1 Enclosure

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J. R. Johnston
R. C. Bushland
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Suggested Techniques for Use in Screwworm Research

D. E. Hopkins
U. S. Livestock Insects Laboratory
ARS-USDA
Kerrville, Texas

This paper presents outlines and discussions of techniques that, I believe, would produce data on the following subjects: (1) determining the egg-mass deposition rates in given areas so that the relative densities of native screwworm fly populations may be determined, (2) determining the degree of effectiveness of sterile screwworm fly releases in given areas, and (3) comparing the sexual performance in the field of strains of screwworm flies.

They are suggestions, and their practicality would have to be tested. However, I believe that they are sound ideas based to some extent on previously used techniques and on research data.

1. Determining egg-mass deposition rates in given areas.

Discussion: Counting the numbers of wild flies caught in liver-bated traps is now the main method for determining indices to the densities of native fly populations. However, it is difficult to establish a relation between the densities of given populations by studying trap catches. The decomposition of the liver causes its attractiveness, and the rate of decomposition varies with the mean temperature and general weather conditions. Also, variables are introduced when non-screwworms enter the traps and blow the baits or when sterile flies are released. (It is possible to make "reasonable-doubt" judgments as to whether a trapped fly is wild or released, but small native flies could be confused with released flies.)

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Determining rates at which egg masses were laid on standard-type wounds would, perhaps, be a better method than trapping for establishing indices to the densities of native screwworm populations. These egg-mass deposition rates would be especially applicable in the tropics where the densities of fly populations are likely to stabilize during wet or dry seasons.

Proposed materials and methods:

a. Define and use standard-type wounds on standard-type animals. For example: Use wounds 1 in. in diameter infested with 50 screwworm larvae and make the wounds on brown goats. Then hold the goats in stanchions.

b. Confine wounded animals in areas to be surveyed. In each area choose sites that are similar in regard to shade and type of terrain.

c. Determine egg-mass deposition rates by counting the egg masses laid on each wound (use only 1 or 2 wounds/survey site/survey period) over a 4-day period. Egg-mass deposition rates from different areas or times could be compared. In each case, they would indicate the relative intensities of the fly activity and thus would reflect the relative densities of the populations.

2. Determining the degree of effectiveness of releases of sterile screwworm flies in given areas.

Discussion: Theoretically, for a sterile male release to have a depressing effect on the reproductive capacity of a native screwworm population, it must cause a sterility rate among wild females that is high enough to assure that the normal proportion of naturally-occurring potential

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screwworm wounds will not become infested. A 70% sterility rate in an area where an average of 4 or more egg masses/potential wound were deposited would not, theoretically, result in reduction in the mean number of natural infestations. In such cases, the capacity of the native population to reproduce itself would not likely be reduced, whereas a 50% sterility rate in an area where an average 1 egg mass/potential wound were deposited would theoretically reduce that reproductive potential by 50%.

In view of the above, efforts should be made to collect data that would indicate the effectiveness of releases in definable areas large enough ~~to be~~ or isolated enough to be free of the influence of immigrating ~~mated~~ fertile females (geographical, weather-influenced, etc.).

Proposed materials and methods:

a. Determine the egg-mass deposition rate in the subject area by using a standard method.

b. Release sterile flies at a given rate for 8 weeks (about enough time for 2 screwworm life cycles).

c. Determine if the egg-mass deposition rate changes. (A minimum of 4 weeks would be required for a release to cause a change in an egg-mass deposition rate.)

e. Determine the degree of effectiveness of the releases by consulting the egg-mass deposition rates and the sterility rates. For example: If the deposition rate were 2 masses/wound/day and the sterility rate were 80%, theoretically every other wound that was attractive for 1 day would receive only sterile masses. Thus, there should be a 50% reduction in the reproduction potential.

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If the egg-mass deposition rate and the sterility rate were to remain constant or the former were to increase and the latter were to decrease, it would indicate that the situation was either static or deteriorating and would not likely result in eradication.

The sterility rate alone is a good indicator, but the egg-mass deposition rate besides indicating the effectiveness of releases would also indicate the relative density of the native population and that indication would be a key as to what additional effort would be necessary to alter each definable static or deteriorating situation.

If data from a certain area indicated that a certain release rate were unlikely to result in eradication, then other factors related to population density and the effectiveness of releases (such as the weather, increased release rates, treatment of wounds, or changing strains) would probably have to change before eradication would occur.

3. Determining the comparative performance of 2 strains in the field (Methods A and B).

General discussion: It is a recognized possibility that in a sterile male release program, factors such as geographical isolation or inbreeding may cause a particular strain to be more or less effective than another. But at this time there are no criteria for laboratory or field testing that are indicative of the comparative performance of strains in the field. There has been no work in which definitive data have been collected. A huge amount of resource has been expended over a number of years, but still the practical evaluation of strains in the field is guesswork or at best a trial and error proposition.

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Method A - Discussion: This method would require that partially sterile males be released. At first the prospect of releasing semisterile males may, to the unimaginative, seem perilous. But this work would, by design, have to be conducted in infested areas where no sterile flies were being released. The effect of such an experiment could only be deleterious to the native fly population. Also, the data gained could only improve the chances for the success of the program.

Method A - Proposed materials and methods utilizing differential sterility:

a. Choose an infested area where no sterile flies have been released for at least 4 weeks.

b. Irradiate one strain with 5000 rad (flies would be 100% sterile) and release a known number of males. (An estimate based on data from Vieques, P. R., would be that in moderately to heavily infested areas (15-30 egg masses/wound per week), a point release of 10,000 males/week could be monitored, i.e., a sterility rate of > 10% would result. A release of 10,000 males would be the equivalent of 500 males/sq mile over 20 sq miles.)

c. Irradiate a 2nd strain with 500 rad (males would be 50±5% sterile). Sex a known number of these 50% sterile males (females would be fertile) and release them (males only) along with the 100% sterile strain.

d. Determine the egg-mass deposition rates of 100% sterile and 50% sterile egg masses to determine which strain mated the higher percentage of native females.

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Method B - Discussion: Sterility rates, when correlated with egg-mass deposition rates, could be indicators of strain performance. This method would require more time than the differential sterility method, and it would also be dependent on the following factors: (1) A constant weather season should be prevalent so that egg-mass deposition rates would likely be constant for prolonged periods. This constancy is more apt to occur during a particular wet or dry season in the tropics than in the continental United States where seasons of the year are pronounced and screwworm activity can wax and wane radically because of weather changes, (2) The test should be conducted in an area where the general ranching routine is nearly constant all year so that the rate at which naturally occurring wounds appeared would be nearly constant. Seasonal ranching practices (such as calving in warm months) can be major contributing factor to fluctuations of screwworm population density.

Method B - Proposed materials and methods utilizing a correlation between egg-mass deposition and sterility rates:

a. Choose an infested area out of the zone treated regularly with sterile flies.

b. By using a standard method, determine the egg-mass deposition rate over a period of 2 weeks.

c. Release sterile flies of one strain for at least 6 weeks (try to gauge the release rate so that the native population density won't be affected).

d. Continue to monitor the egg-mass deposition rate and determine the sterility rate.

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d. Continue to monitor the egg-mass deposition rate and determine the sterility rate.

e. Determine a correlation factor between the 2 rates.

f. After 6 weeks of releases (a minimum of 4 weeks would be required for a release to affect an egg-mass deposition rate), stop releasing the 1st strain and start releasing sterile flies of the 2nd strain at the same rate at which the 1st strain was released.

g. Continue to monitor the sterility and the egg-mass deposition rates. Data from Vieques indicate that a sterility rate begins to assert itself 4-6 days after a release. Therefore, if the release of the 2nd strain were to cause a change in the sterility rate, the change should be well established by the end of the 2nd week of releases. However, an additional 2 weeks (minimum) would be required for a change in the egg-mass deposition rate to be effected if it were to occur.

h. After the 2nd strain has been released for 2 weeks, determine whether a difference in strain performance is indicated by changes in the sterility rate or the correlation factor between the sterility rate and the egg-mass deposition rate.

If releases of the 1st strain caused a diminishing egg-mass deposition rate or an ascending sterility rate, the effect of these factors should be considered before the 2nd strain is released.

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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
SOUTHERN REGION

Screwworm Research Laboratory
P. O. Box 986
Mission, Texas 78572

July 1, 1974

Dr. O. H. Graham
U. S. Livestock Insects Laboratory
P. O. Box 232
Kerrville, Texas 78028

Dear Hugh,

Thank you very much for the reference on lipid metabolism in the Blowfly Lucilia sericata.

I would like to have a complete copy of the article. Since none of us have the Annals, I would appreciate it if you would make a copy and forward it to me. The volume and page is: Ann. ESA, Vol. 66, No. 4, Pages 797---.

Thank you very much.

Sincerely,

Harold

Harold E. Brown
Research Chemist

copy forwarded 11 VII 74

Copy Received 11 DEC 74

Screwworm Research Laboratory
P. O. Box 986
Mission, Texas 78572

July 23, 1974

Subject: "New" Screwworm Research Proposal

To: A. W. Cooper, Deputy Administrator, Southern Region
Thru: H. C. Cox, Associate Deputy Administrator, Southern Region
Thru: E. A. Taylor, Area Director, Subtropical Texas Area

Enclosed is a proposal for Mission that I consider as meeting our research need for the expanded screwworm program. As you know, the program has been plagued with problems since 1972, and this year appears to be no exception. The situation is certainly worse than last year and the Gulf Coast Tick is again becoming a problem. I can see no way to get by 1974 without heavy losses to livestock in the United States. Already infestations have been reported in Arkansas and Oklahoma. This year will probably be another year of maximum jeopardy to the Southeastern United States from the standpoint of reinfestation based on the current distribution trends. I believe the enclosed proposal with Dr. Goodenough's money and additional SMY's will add enough teeth to our current research effort to put the program back on a sound basis.

If you agree with further expansion of the screwworm program, ARS currently has a scientist, C. J. Whitten, at College Station, who fits our needs for a physiologist-production scientist. Mr. Whitten completes his Ph.D. in August and has expressed a desire to transfer to Mission. Dr. Ridgway, while pleased with Mr. Whitten's performance, agrees that a transfer after completion of his degree (He received all three at Texas A&M.) would be beneficial to Mr. Whitten. He has expertise in genetics, isoenzyme techniques, insect rearing, and biochemistry that fits our needs for a scientist to develop competitive factory strains and investigate the possibility of biotypes.

If you need additional information regarding this proposal, please let me know. I feel very strongly that the screwworm program can be lost without an extra push for the next few years.

J. Wendell Snow
Research Leader

CURRENT MISSION RESEARCH STATUS AND REQUIRED CHANGES TO MEET RESEARCH NEEDS FOR THE EXPANDED SCREWWORM ERADICATION PROGRAM

History of Program.

From 1962 to 1971 (with a minor exception in 1968), the screwworm eradication program successfully controlled screwworms in the United States. During this time, the ARS Research Laboratory was established (1963) at Mission with a budget of $200,000/year. However, these funds were allocated through the Kerrville Laboratory and passed to Mission based on numbers of SMY's rather than appropriated funds. During this period, many professionals transferred or retired without replacement. From a maximum of 6 staff members in 1963, only 3 remained committed to screwworm research by 1972.

During 1972, the program suffered a serious setback in the southwestern states. A total of 96,625 cases were reported in Texas alone. There were undoubtedly more unreported cases. During this year, the United States signed an agreement with Mexico to extend the eradication program to the Isthmus of Tehuantepec.

During 1973, the situation was again serious in South Texas. Some ranchers reported as much as 30% loss of herds. Effective control was not obtained until late season as a result of adverse weather. This outbreak was related to high populations of the Gulf Coast Tick that provided large numbers of wounds. In 1974 the situation through June indicates another bad year. Infestations are currently 3 times greater than 1973 and range throughout most of Texas. Gulf Coast Ticks are becoming common in South Texas.

Therefore, the fact becomes apparent that the screwworm program has been extended to include Mexico at a time when results suggest that serious problems exist in our current program. The Agricultural Research Service recognized this after the 1972 outbreak and began restaffing the laboratory and transferring support funds. Currently, 5 SMY's are at Mission with a chemist on loan from Crops Research, Weslaco, Texas. The current proposed budget for FY 75 is $291,700. However this figure includes salary for an Engineer and should be adjusted downward to $270,847 ($20,853 salary) since the Region has not agreed to this shift. The additions have been made through reallocation of existing personnel and funds. The APHIS budget for Mexico and the United States will range from 16 to 20 million/year. Based on current problems and the expanded program, ARS will not be able to adequately meet the research needs of the APHIS program. A proposal is currently before Congress to increase the Mission budget by $202,000/year (minus 15.2%) and provide 3 additional SMY's.

Potential Causes of Reduced Program Effectiveness.

The highest research priority is the identification of the fact or factors involved in the recent ineffectiveness of release flies. Candidate reasons are:

1. Nutrition. The factory converted to a hydroponic diet shortly before the first outbreak in 1972. This diet has been used since that time. Sufficient data are not available to establish this medium as a good substitute for meat.

2. Assortive Mating. The selection of an avoidance or recognition mechanism by wild flies over the last 12 years (resistance).

3. Behavioral Isolation. Undetected changes in rearing and handling procedures that resulted in alteration of behavior sufficient to isolate the released population (preferential mating of factory x factory flies).

4. Laboratory Adaptation of Strains. Factory strains may lose the ability to compete in the field through natural selection in the process of becoming adapted to factory production.

5. Remating. Factory males may no longer be able to satisfy the wild females in copulation. Equally possible is the selection of wild fly populations that mate multiply.

6. Ticks. Increase screwworm cases resulting from an increase in number of wounds caused by the Gulf Coast Tick.

7. Quality Control. Inadequate control of quality in the rearing, packaging, or distribution phase that results in the release of non-competitive insects.

8. Weather. Favorable weather which results in excessive survival of screwworm populations during the winter months.

9. Changes in Practices. Ranchers have changed their practices with the result of more cattle, uncontolled calving, absence of sufficient cowboys, etc.

While we must investigate all the above factors, our commitment for new research and improved procedures continues. Population detection methods are desperately needed for survey and evaluation. Additional

control components are needed as the program moves into Mexico. The Mexico program demands more ecological data regarding distribution, abundance and overwintering. Strong possibilities exist that biotypes of the species in the diverse terrain of Mexico.

Current SMY's at Mission.

Research Leader (J. Wendell Snow). Coordinates research and cooperative agreements (Texas A&M, University of Texas, INIA, Monterrey Tech) into the screwworm eradication program with both APHIS and the Joint Screwworm Commission. In addition, original research will be conducted by the Research Leader in the areas of ecology, attraction, and competitiveness.

Ecologist[1/] (Billie G. Hightower--to transfer in August). Provides field research on the species in diverse situations of Mexico. All the varied factors encountered in production and distribution of 200 million sterile flies per week plus an additional 300 million weekly when the plant in Mexico is activated must be recognized and evaluated. Behavior of wild flies in canyons and mountain saddles is of particular importance. The existence of biotypes or even distinct species in Mexico must be studied.

Radiation. (Maxwell M. Crystal). The effects of radiation on competitiveness and development of improved methods of sterilization are of principal importance. The effects of radiation on competitiveness

1/ High priority position--needs to be filled desperately.

is a candidate cause of current program problems. The development of chemical markers such as Calco Red, Rubidium, etc., that are compatible with factory production will also be studied. Currently the factory and wild flies cannot be effectively separated. In addition, physiological studies involving digestion, enzyme systems, and flight are needed to support nutritional studies and laboratory evaluation systems for performance.

Entomologist (Host and oviposition attractant, Calvin M. Jones). Effective attractants are desperately needed for use in population surveys or as supplemental controls. We do not have a bait better than decomposing liver. Liver only attracts female screwworms in addition to hugh numbers of ordinary blow flies. This fact alone makes it impractical to monitor eradication progress with liver traps. Therefore, this position involves the evaluation of chemical, physical, or microbial factors associated with the wounds of animals which may be responsible for the attraction of screwworm flies to their hosts for feeding and/or oviposition.

Engineer. (John L. Goodenough) Much engineering expertise is needed in the improvement of procedures related to rearing, fly distribution and trapping. Of immediate concern is the development of equipment to remove waste products in larval rearing, separation of larvae and pupae, and the improvement of packaging and distribution equipment. Physical attractants (sound) will occupy a considerable portion of the engineer's time in addition to providing leadership in the design of traps as attraction mechanisms are found.

Chemist (Harold E. Brown). Dr. Brown is currently on loan from Weslaco and hopefully will remain with our program. The chief need is for extensive nutritional studies of the hydroponic diet. Nutrition and the hydroponic diet are candidate causes for recent program problems. In addition, the chemist must lead our team effort directed toward the isolation, identification and synthesis of host, sex, oviposition or aggregate attractants. The chemist must have diverse talents and be extremely efficient to meet his commitment to both pheromes and nutrition.

Additional SMY's Needed.

Geneticist. This area presents a special problem for our research effort. The immediate problem is to determine the best method for introduction of genetic material into the Mission stock to insure the best interim results. At the same time, long term solutions must be sought to set standards ~~insure continuous quality of reared insects~~. This individual must work with the Mexico ecologist to study the possibility of biotypes and determine how to maintain insects for the diverse terrain and weather situations of Mexico (one strain for all areas or special strains for special areas, etc.).

Entomologist (rearing and physiology). This individual will handle the actual incorporation of genetic material into the factory strain and develop procedures to prevent factory adaptation of fly strains while retaining characteristics for good production. In addition, this individual will conduct isoenzymes studies to determine their use as monitors for laboratory population. The same technique will be used to determine the existence of biotypes (in cooperation with the geneticist and ecologist).

Art Standards

Ecologist. To study the biology and ecology of the screwworm as it relates to the sterile male technique in the United States. The number one priority in this research is to understand the total concept as it relates to the screwworm so that the causes for recent outbreaks can be determined. Life tables will result from this work. Program effectiveness will also be evaluated by the ecologist. He will evaluate the final selection of strains for mass rearing as well as other variables before they become integrated into the program. This work will be coordinated with the other ecologist.

Entomologist (Sex attraction and mating behavior). No effort is being made to use sex attractions as a survey tool, and screwworm mating has never been observed in nature. This area has been long neglected and needs a full-time commitment. Sex attraction offers a method of survey as well as supplemental control. Knowledge of mating habits and behavior can be critical in the eventual success of the program.

Entomologist (Gulf Coast Tick). In the last few years, the Gulf Coast Tick has increased in abundance throughout South Texas. The net result has been an increase in wounds for screwworm attack. Ticks have been cited as the principal cause of the 1973 outbreak. The situation appears similar for 1974. Little is known about the biology and control as it relates to the screwworm. Research effort is needed to provide the information necessary to control this pest.

Tabular Summary of SMY's.

Scientist[1/]	Grade	Title or Responsibility	Salary	Country
J. W. Snow	14	Research Leader	$26,429	USA
M. M. Crystal	14	Radiation Biology	28,969	Mexico
H. E. Brown	13	Chemist	26,429	USA
J. L. Goodenough	12	Engineer	20,853	USA
B. G. Hightower[2/]	12	Ecologist	29,845	Mexico
C. M. Jones	12	Entomologist (Host & Oviposition Attractant)	26,142	USA
Vacancy	12	Geneticist	20,853	USA
Vacancy	12	Physiology & Production	20,853	Mexico
Vacancy	11	Ecologist	20,853	USA
Vacancy	11	Entomologist (Sex Attraction)	20,853	USA
Vacancy	11	Entomologist (Ticks)	20,853	USA
11 SMY			262,932	

1/ Includes scientists for Mexico and US.

2/ To leave ARS in August.

The tabular estimate shows only direct cost for scientists and includes a later expansion of 3 men to Mexico. The total appropriation for this approach should be $660,000/year ($60,000/SMY). Costs involved in establishing facilities in Mexico are not included. The placement of personnel at Mission for later transfer to Mexico is advantageous in that the best qualified personnel from our laboratory can be transferred. In addition, new scientists can gain screwworm experience and establish the basis for later cooperation.

If the placement of personnel in Mexico must be delayed, Mission needs a minimum of 8 SMY's. This can be accomplished by combining the 2 ecologists, eliminating tick work (assumes this is to be done at other locations) and combining the geneticists and physiologist-production positions. This reduces the SMY salaries to $200,373. To provide adequate support, the budget should be $480,000/year. The figure of $60,000/year/SMY is used because of extensive travel and technical assistance needed to support an action program.

Our current fiscal situation is the following:

$270,847	Regular appropriation (minus Goodenough's salary)
171,296	New money from Congress ($202,000 minus 15.2%)
$442,143	Total with Congressional approval
$480,000	Needed for support.

Thus we are short funds even with the new appropriation from Congress. Therefore, Mission requests salary as well as position for Dr. Goodenough. In addition, three slots are needed to bring our SMY's to the level necessary to meet our research commitment.

w/ Bill H.

I. INIA coop. –

a. NASA angle –

b. COTAXTLA possibilities –
(1) lab space + equip. –
(2) De la Paz
(3) new air service –

c. CUAUHTEMOC station –
(1) in depth study, La Gloria
(2) space? – airport bld

II Trapping study –

a. Tampico – Guayalejo – alda
trans –

b. La Pesca – cd Victoria l
purpose: ratio, wild: st
some survival d
use: dyed flies for bette
survival + dispersal a

c – future: s.l. ... y a ti

III Annual pens –

a. sheep – 34 available.
4 pens constructed; post +
wire for 20's;

b. calves – castration or
other wounds –
haltered, checked
frequently

c. no good except during
periods of population build –
must be having cases to
supply emerging wild ♀♀

IV admin angles –

a. Tampico enter pro
b. Corona –
c. Balderas –
d. Rogelio

– COPY OF THESIS INCHEZ
ING. ANGEL RAMOS GO
ecol. study – CHAP
Egg mass collection – empu –
Velazco – send to Mesa
Tampico to
area around Ciudad

TRAPS =
CASE REPORTS
WEATHER DATA
SHEEP PENS

LA GLORIA

IN RELATION TO

SHADING
AIR MOVEMENT
HUSBANDRY
WATER COURSES
WILD ANIMAL POPULATIONS

DYED FLY RELEASE?
TO GIVE SURVIVAL DATA
FLY MOVEMENT
? a strain comparison

at CUAUHTEMOC
? small colonization capability

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
VETERINARY SERVICES
FEDERAL CENTER BUILDING
HYATTSVILLE, MARYLAND 20782

Subject: Paper by D. E. Hopkins August 14, 1974

To: O. H. Graham, Entomologist
Livestock Insects Laboratory
USDA, ARS
P.O. Box 232
Kerrville, TX 78028

I have reviewed at your request the paper by D. E. Hopkins entitled, "Population Density and Reproductiveness." I find this to be a good paper. It is apparent that Mr. Hopkins has put a lot of excellent thought into this paper.

However, we often fall into the trap of assuming that the released flies are equal to the wild flies on a one-to-one basis. Al Baumhover has written at least one memorandum on this subject. We also fall into the trap of assuming that different strains are equal in their ability to compete. I have written three memorandums relating to these subjects and also to the problem that Mr. Hopkins is dealing with. I am enclosing copies of these memorandums, including one by Al Baumhover. I am also enclosing some comments on Mr. Hopkins' paper. He may wish to revise his thinking somewhat after reading this material.

I do not know if the material he has by E. F. Knipling or others has information on how required release rates for various reproductive rates of the wild fly and for different rates of decline vary. Consequently, I have prepared a table on the subject that I am also enclosing.

In a stable population such as existed on Vieques, population theory says that the population will reach a limit and remain at that limit. However, it would seem that if the population is being depressed by a sterile fly release that the reproductive rate would increase to compensate for the depressing effect of the sterile fly release. This may explain why we saw no apparent results from the initial release levels. We will probably have this same problem in Mexico. I hope that Mr. Hopkins will pursue this problem further.

Victor C Beal Jr

Victor C. Beal, Jr.
Biometrician
Programs Development and Application

Enclosures

COMMENTS ON PAPER BY D. E. HOPKINS

1. Page 3, Paragraph 3 - Calculations on population change are correct. Whether or not the wild population is eliminated by the fourth generation will depend upon the size of the initial population.

2. Page 3, Paragraph 4 - An analysis of the results on the Island of Vieques during 1972 and a mating test at Mission indicates that the mainland sterile flies lacked complete sexual compatibility with the Puerto Rican strain. The mainland strain was used up to the middle of 1972 on Vieques and longer on Puerto Rico. This lack of sexual compatibility is not an all or none situation.

3. Page 4, Paragraph 1 - Mention is made that there is not reproductive increase in a stable population. In the situation such as on Puerto Rico or Vieques, this is probably due to there being a limit to the population that can be supported by the environment. However, once the population starts to be suppressed by sterile flies, the reproductive increase comes into play.

4. One must remember that calculations by Baumhover and others indicate that the sterile fly does not possess equal competitiveness with the wild fly but may never be any better than about one-eighth as competitive.

5. Page 5, Paragraph 2 - It may be that such things as host availability is generally the limiting factor in the tropical areas.

6. Page 6, Paragraph 5 - Natural population depressants and assistants are mentioned. It may be that host availability suppresses the population under most conditions but serves as a population assistant when the population is being depressed by sterile flies.

7. Page 7, Paragraph 1 - 100 females gives 20,000 eggs
4,400 larvae
968 pupae
213 flies

I assume that 22 percent of the emerging flies would lay eggs under the assumption. This means that survival rate would have to be some other number, namely 31.6 percent in order togive 200 reproducing flies.

100 females gives 20,000 eggs
6,320 larvae
1,997 pupae
631 flies
100 egg-laying females
199 mature flies

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6,320 larvae
1,897 pupae
631 flies
100 egg-laying females
199 mature flies

COMMENTS (Continued)

8. Page 8, Paragraph 2 - It has been assumed that each navel wound will have 4.3 wounds. Is this a reasonable assumption? Are navel wounds as attractive as wounds on penned animals?

9. Page 8, Paragraph 3 - One assumption made here is that the sterile flies are 100 percent competitive with the wild flies. Baumhover's data indicates 8 sterile flies equal 1 wild fly. Data for the Tex-Mex strain in the APHIS field trial in fall of 1973 indicated that 8 to 15 sterile Tex-Mex flies equaled one wild fly. Data from the same field trial indicated that 22 to 32 APHIS flies equal one wild fly. This would be sterile flies that remain physically capable of flying so that they can be trapped.

   Indications are that the Puerto Rican strain was 10 times as competitive as the Mexican strain in use in February and March of 1972. If we assume that eight Puerto Rican flies equaled one wild fly, then 80 Mexican flies would equal one wild Vieques fly.

Reproduction Frequency	Equilibrium Release Rate	Amount of Sterility Needed for Decline of 10%	25%	50%
n to 1	(n - 1) to 1	(n - 0.9)/n	(n - .75)/n	(n - .5)/n
10 to 1	9 to 1	91.0	92.5	95.0
8 to 1	7 to 1	88.75	90.625	93.75
5 to 1	4 to 1	82.0	85.0	90.0
2 to 1	1 to 1	55.0	62.5	75.0
1 to 1	0 to 1	10.0	25.0	50.0

Generation	Release Number*	Wild Population	Reproduction Rate*	Sterility Rate	New Generation
0	9,000	1,000	5 to 1	90.0	500
1	9,000	500	5 to 1	94.74	131.58
2	9,000	131.58	5 to 1	98.56	9.48
3	9,000	9.48	5 to 1	99.89	0.05
0	10,111	1,000	10 to 1	91.0	900
0	12,333	1,000	10 to 1	92.5	750
0	19,000	1,000	10 to 1	95.0	500
0	7,889	1,000	8 to 1	88.75	900
0	9,667	1,000	8 to 1	90.625	750
0	15,000	1,000	8 to 1	93.75	500
0	4,556	1,000	5 to 1	82.00	900
0	5,667	1,000	5 to 1	85.00	750
0	9,000	1,000	5 to 1	90.00	500
0	1,222	1,000	2 to 1	55.0	900
0	1,667	1,000	2 to 1	62.5	750
0	3,000	1,000	2 to 1	75.0	500
0	111	1,000	1 to 1	10.0	900
0	333	1,000	1 to 1	25.0	750
0	1,000	1,000	1 to 1	50.0	500

*Assumes competitiveness of one sterile fly to one wild fly and must be adjusted for actual competitiveness.

* This reproduction rate may be readily subject to change. It may increase to compensate for the depressing effect of a sterile fly release (See 4th paragraph of Dr. Beal's letter.) This possibility should be allowed for in tables such as these. DEV.

Reproduction Frequency	Equilibrium Release Rate	Amount of Sterility Needed for Decline of 10%	25%	50%
n to 1	(n - 1) to 1	(n - 0.9)/n	(n - .75)/n	(n - .5)/n
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3	9,000	9.48	5 to 1	99.89	0
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0	333	1,000	1 to 1	25.0	750
0	1,000	1,000	1 to 1	50.0	500

*Assumes competitiveness of one sterile fly to one wild fly and must be adjusted for actual competitiveness.

North Carolina diagnostician, made an investigation in Macon County, North Carolina. All five of these investigations were negative for vesicular diseases.

HOG CHOLERA ACTIVITIES

Hog cholera virus has not been isolated in the United States since May 16, 1974. This disclosure resulted from the examination of tissues collected from all the swine in a herd depopulated in Puerto Rico because of potential exposure to a case confirmed on May 4, 1974. Prior to the confirmation on May 4, 1974, Puerto Rico had not disclosed a case of hog cholera for more than a year and was considered hog cholera "free". Evidence of virus spread caused Puerto Rico to revert to Phase III of the hog cholera program. Since no additional infection was disclosed, Puerto Rico returned to Phase IV of the program on August 16, 1974, and should be again eligible for "free" status on November 16, 1974.

All 50 States in the Continental United States remain in the hog cholera "free" status as outlined by the program standards. The most recent case of hog cholera confirmed in the Continental United States occurred in Mississippi on February 7, 1974. Prior to this, a case occurred in Indiana on June 28, 1973. The Mississippi case interrupted a period of 225 days without confirmation of hog cholera in the Continental United States. This was the longest period the United States was free of hog cholera in more than 100 years. The current period without hog cholera in the United States has now exceeded the former record of 225 days.

Continued surveillance for any potential hog cholera infection continues to be emphasized.

JOINT SCREWWORM ERADICATION COMMISSION MEETING HELD IN MEXICO

The joint Mexico-U.S. Commission for the Eradication of Screwworms held its fifth meeting in Tuxtla Gutierrez, Chiapas State, Mexico, on September 18, 1974. The morning was devoted to an on-site tour of the new screwworm production plant currently under construction in Tuxtla Gutierrez. Over 300 million screwworm flies will be raised and sexually sterilized in the Tuxtla plant--now scheduled for full production by the summer of 1975. These flies--combined with the over 200 million flies now being raised each week in the Mission, Texas, plant--will be released over Mexico until screwworms have been eradicated as far south as the Isthmus of Tehuantepec. A barrier zone to prevent reinfestation will then be maintained across the Isthmus. The commissioners spent the rest of the day discussing current progress in organizing and staffing the Mexico program.

Screwworm, the larva of the screwworm fly--is a deadly parasite of warmblooded animals. It feeds on the living flesh of host animals, which it attacks through open wounds and sores.

The principle eradication technique involves releasing millions of sexually sterile flies which mate with native fertile flies. Such matings produce eggs that will not hatch. As more sterile flies are released, chances for fertile matings become less and less and the native screwworm fly population diminishes and eventually disappears.

Eradication of screwworms in Mexico--expected to be complete by the early 1980's--will directly benefit U.S. as well as Mexican livestock producers. Currently, Texas and other Southwestern States are subject to seasonal reinfestation of screwworm from Mexico. Eradication of the pest and establishment of a barrier zone will eliminate this threat of reinfestation.

The Commission, established in 1972, is made up of equal representation of Mexico and U.S. authorities in animal health and agriculture. It is headed by Dr. Richard L. Feltner, U.S. Department of Agriculture's (USDA) Assistant Secretary for Marketing and Consumer Affairs, and Dr. Gustavo Reta Pettersson, Subsecretary for Livestock, Mexico Secretariat of Agriculture and Livestock (SAG). Other commission members from the United States are:

Dr. Francis J. Mulhern, Animal and Plant Health Inspection Service (APHIS), Administrator; Dr. John M. Hejl, Deputy Administrator of APHIS's Veterinary Services; Dr. Robert S. Sharman, retired Associate Deputy Administrator for APHIS's Veterinary Services and formerly Co-Director of the Joint Commission for the Prevention of Foot-and-Mouth Disease, Mexico; and Dr. Norvan L. Meyer, Co-Director of the Joint Mexico-U.S. Screwworm Commission.

Commission members appointed by Mexico are:

Dr. Hector Campos Lopez, Director General of Animal Health, SAG; Lic. Francisco Ramon Cantoral, Director of International Affairs, SAG; Dr. Pablo Zierold Reyes, retired Director of Veterinary Medical Faculty, University of Mexico; and Dr. Marco Antonio Villasenor, Director of the Joint Mexico-U.S. Screwworm Commission.

PUERTO RICO CATTLEMEN WARNED TO WATCH FOR TROPICAL BONT TICKS

Puerto Rico's cattlemen are being warned by the U.S. Department of Agriculture (USDA) to be on the lookout for the tropical bont tick (Amblyomma variegatum)--a carrier of several human and animal diseases.

The warning follows confirmation that in June the bont tick was found for the first time in Puerto Rico.

Cattlemen should especially examine the flank and leg areas of their cattle, although the bont tick can attach itself anywhere on the animal. All ticks should be placed in a vial with alcohol and sent for identification to a Commonwealth regional office or to a county extension agent.

APHIS officials point out that the bont tick needs three animals to provide it with a "home" before it completes its life cycle. The most common of these host animals are cattle, sheep, goats, horses, and dogs, and all should be examined.

To date, bont ticks have been found on 26 premises in the neighborhood of Cidra and Cayey, some 25 miles south of San Juan.

JIMMY DEER

June - 14 to 1
July -
Aug-Sept - 1 to 1

control - 1948-49
DDT
DDT + lindane
toxaphene

axle grease 4% DDT
10% Sevin

tool joint compound

DR. ALBERTO PIÑON
Cd. Victoria, Tamps

May 1969
TICKERAD
began in Tamps --
20-25" rainfall

a b c d e

155
183
338

1. Co-Ral
2. Rabon
3. toxaphene

1933 Outbreaks
(85% pre-disposed by ticks

remedies —

axle grease, turpentine
kerosene, lard

Asuntol
Batestan
Dursban
Supona

3 pine tar oil
1 cottonseed oil
1 pint benzol

Dips + sprays —
1 pint — 3% DDT

ARSENIC DIP

Dip 30 =

Pasture moving
+ burning

0.5% DDT + 0.03 lindane

0.5% toxaphene — Cooper tox

Stock 1037
5% DDT

0x15 Delnav

0.12% Coral dip
0.25% spray

8 lbs WP
(25%

	SCREWWORMS 1973													SCREWWORMS 1974										
	J	F	M	A	M	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S	O	N	D
BROOKS	2	2	1	4	10	32	68	336	811	605	198	4				1	3	4							
CAMERON						1		1	4	9	44	11	70		1	2	4	5							
DUVAL		1		5	3	5	23	19	46	130	209	40					10	8							
HIDALGO	18	1	1	2	10	11	28	84	141	291	441	92	1128	5	1	11	7	12							
JIM WELLS	2			1	3	3	4	6	10	77	223	43		2			6	4							
JIM HOGG	6	1	2	3	2	9	53	146	284	179	120	13				2	6	16							
KENEDY	1			1	2	22	37	183	174	121	50	2				3	5	3							
KLEBERG	2			1	1	4	11	23	22	57	125	35		2	3		1	0							
NUECES									1	15	82	18	116				0	0							
STARR	6	1	1	3	1	1	49	96	158	321	218	28		3		4	9	14							
WEBB	6	-	-	-	-	-	2	4	20	96	183	27	338	8	1	13	23	31							
WILLACY	2					9	20	19	23	37	19	5				1	3	2							
ZAPATA	2				1		5	7	19	78 41	55	7	174	2		6	12	4							
TOTALS	47	6	5	20	33	97	300	924	1713	2016	1967	325		22	6	43	89	103							

(Figures for May, 1974, are computed through May 17 -----)

COMISION MEXICO-AMERICANA PARA LA ERRADICACION DEL GUSANO BARRENADOR

LA ENERGIA ATOMICA AL SERVICIO DEL GANADERO

LEIBNITZ No. 20 - 12o. PISO
MEXICO 5, D. F.

DIRECTOR:
DR. MARCO ANTONIO VILLASEÑOR
TEL. 531-65-96

CO-DIRECTOR:
DR. NORVAN L. MEYER
TEL. 531-65-69

A G E N D A

FOURTH MEETING OF THE MEXICAN-AMERICAN COMMISSION FOR THE ERRADICATION OF SCREWWORM

1ST SESSION - MARCH 28, 1974 - 10:00 A.M. -
AGRICULTURE ADMINISTRATION BUILDING -
ROOM 218 A.

I. Approval of Minutes of the Third Meeting (October 24-25, 1973) ✓

II. Program activities since last meeting.

a) Infestation situation in Northern Mexico Dr. Villaseñor
Information program - Dr. Meadows
b) Construction summary of Phase II. ++++++
Meyer & Werring -
c) Negotiated contract for the architectural and structural aspects of the plant. Meyer Werring, Dick Ellwood

d) Financial Report

III. Items from last meeting.

a) Regulations.

b) Integration of Northern Program.

c) Change in International Agreement.

IV. Cooperative screwworm test projects.

a) Assortative Mating

b) Field competitiveness of new strain

V. Remote-Sensing-NASA-CONEE project.

VI. Date and place of next meeting.

geneticists / population geneticists

genetically vigorous, highly ~~heterogeneous~~ heterozygous strain of flies — as nearly wild type as possible

A, B, C. strains — mixed for hybrid vigor

PHYSIOLOGY

nutrition research —

Ecology — effects of climate in mexico — esp. southern mexico

Full complement of inspectors in the field in Mexico in October 74 (meyer)

meadows - 102 cases to date in 74, 56 in march, 3 in Arizona, 8 in Calif.

30% of cases in man-made wounds, 40% in navels, i.e., 70% of cases could be eliminated by better management

April '75 is still projected date for completion of plant at Tuxtla, but this depends on having footings and foundation completed before rainy season (may '74).

$30,000,000 MN - Engañosa - eliminate certain features & save money -

Additional data provided by other researchers confirmed: (1) viral antigenicity showed little variation 17 weeks after experimental infection; (2) the carrier state in vaccinated cattle was unimpeded by the presence of antibodies; and (3) the carrier state persists in cattle up to 15 months and in sheep up to 4 months.

During recent investigations in Brazil, foot-and-mouth disease virus was isolated from 52.7 percent of vaccinated cattle in various regions free of the disease for at least 6 months.

This accumulated research data highlights inherent dangers. As an increasing proportion of an animal population become carriers, there is greater probability for the emergency of antigenic variants. Ultimately, the variant strains may overwhelm the existing herd immunity and create new outbreaks.

In recent years, the increasing importance of artificial insemination presents a final consideration in the transmission of foot-and-mouth disease. When bulls were artificially infected, foot-and-mouth disease virus was recovered from the semen as early as 12 hours and as late as 10 days afterward. Subsequent use of this semen produced clinical foot-and-mouth disease in 38 percent of inseminated calves. In a separate trial involving 22 bulls free of clinical signs of FMD for at least 6 months, virus was isolated from the frozen semen of seven.

Additional research is planned on the persistence of foot-and-mouth disease virus in bull semen and its possible elimination without impairment of spermatozoa viability. Investigations might also be directed to study of the role of the vaccinated bull in the dissemination of foot-and-mouth disease virus to offspring via unvaccinated cows free of the disease.
(* Abstracted from: Pustiglione Netto, L. Carriers in foot-and-mouth disease. Biol. Sao Paulo, 39(1): 14-16, 1973).

MEXICO SCREWWORM PLANT CONSTRUCTION UNDER NEGOTIATION

As of March 29, 1974, Mexican and U.S. officials were negotiating with contractors for construction of the main building of a facility in southern Mexico in which to produce more than 300 million sexually sterile screwworm flies each week.

Progress with negotiations and other efforts related to eradicating this livestock pest from Mexico was reported to the joint Mexico-U.S. Commission for the Eradication of Screwworm meeting at the U.S. Department of Agriculture in Washington, D.C., March 28, 1974.

The unique production plant is scheduled to be completed in 1975. Land leveling, road building, and construction of some related structures are now underway. Sterile flies from the plant, located near Tuxtla Gutierrez, will be released from aircraft over screwworm-infested areas of Mexico.

When the sterilized screwworm flies mate with native screwworms, the eggs that result are sterile, thus diminishing the insect's ability to multiply. The technique has been successful in the United States. Authorities estimate that

several years will be required, however, to eliminate the costly pest from Mexico and thereby lessen the threat to U.S. livestock.

When screwworm eradication is completed north of Tuxtla Gutierrez, a permanent barrier will be formed against northward migrations of the insect, by continuously releasing sterile flies in a wide path across Mexico's narrow Isthmus of Tehuantepec.

A report to the Commission on the current screwworm situation in northern Mexico indicated there could be serious outbreaks if the weeks ahead bring heavy moisture and warm weather. Conditions in this area usually indicate the intensity of seasonal screwworm threat to livestock in the southwestern United States.

The joint screwworm eradication commission has equal representation of Mexican and United States agricultural and veterinary officials, two of whom serve as full-time director and co-director.

EMERGENCY VECTOR AND PEST CONTROL WORKSHOP

On April 2-4, 1974, an Emergency Vector and Pest Control Workshop was held at the Plant Protection and Quarantine Training Center, Battle Creek, Michigan. The workshop, sponsored jointly by Emergency Programs, Veterinary Services, and Emergency Programs, Plant Protection and Quarantine, was designed to prepare selected VS and PPQ personnel to conduct emergency vector and pest control operations in support of animal and poultry disease eradication programs.

Topics which were considered during the workshop included: The Philosophy of Foreign Animal Disease Eradication; Utilization of Resources Outside of USDA; Organization of a Vector or Pest Control Unit; The Federal Insecticide, Fungicide, and Rodenticide Act; Crop Insect Control Techniques and Regulatory Requirements; Vector Control Techniques; New Approaches in Plant Disease Control; and Contract Negotiation for Vector and Pest Control. In addition, half of each day was devoted to a test exercise involving eradication of the tsetse fly, Glossina palpalis, in support of a hypothetical trypanosomiasis outbreak.

WORLD POULTRY CONGRESS

The XV World's Poultry Congress/Exposition held every four years, will convene at the Port of New Orleans, Exhibition Center "The Rivergate," New Orleans, Louisiana, on August 11-16, 1974. The Congress theme is "Focus on Feeding Mankind." Papers will be presented on all phases of poultry production, ecomonics, genetics, nutrition, products technology, physiology, pathology, and disease eradication. Ten U.S. Department of Agriculture agencies are sponsoring a Service Center in which the role of USDA relative to the poultry industry will be explained.

At the World's Poultry Congress, a symposium on Viscerotropic Velogenic Newcastle Disease will be held. Another symposium will be on "Establishment of Disease Free Poultry Flocks." Dr. H. E. Marthedal, Institute of Poultry Diseases, Royal Veterinary and Agriculture University, Copenhagen, Denmark, is chairman.

Library
MAY 23

FOREIGN ANIMAL
DISEASES REPORT

APRIL 1974

EXOTIC NEWCASTLE DISEASE QUARANTINE EXTENDED IN EL PASO, TEXAS

On March 27, 1974, Federal and State quarantines to stop the spread of exotic Newcastle disease in the El Paso, Texas area were extended along the U.S.-Mexico border southeast of El Paso to the El Paso-Hudspeth county line.

The quarantine extension along the 3-mile wide corridor was imposed by USDA's Animal and Plant Health Inspection Service (APHIS) and the Texas Animal Health Commission when the disease was confirmed in two backyard flocks and a commercial egg ranch near Clint. These are the first new cases of the disease in the area since March 8, 1974.

The disease was originally confirmed in El Paso on February 13, 1974. Within 24 hours a State-Federal task force moved into the area to start operations to establish the quarantine, test flocks, destroy infected and exposed birds, clean and disinfect premises, and keep all birds in the area under surveillance to find any additional infection. By March 8, 1974, 45 flocks containing some 1,100 birds had been destroyed and flock owners were paid indemnity of around $6,000 to help compensate them for their losses.

The two backyard flocks in Clint were destroyed March 25, 1974. These flocks consisted of about 100 birds, and included chickens, ducks and turkeys. The commercial flock of about 188,000 white Leghorn hens has been appraised and destroyed.

On April 12, 1974, the quarantine was further extended to include the residential section between Fort Bliss and the Franklin Mountains and from Interstate 10 to Hercules Avenue. This area was quarantined when a small backyard flock in the area was found infected. As of April 23, 1974, a total of 88 infected and exposed flocks consisting of about 190,570 birds have been depopulated.

USDA DECLARES PUERTO RICO HOG CHOLERA FREE

On March 29, 1974, the Commonwealth of Puerto Rico was officially recognized as "hog cholera free" by the U.S. Department of Agriculture (USDA) with the presentation of a certificate signed by Secretary Earl L. Butz.

THE NEW SCREWWORM THREAT

TEXAS A&M UNIVERSITY
TEXAS AGRICULTURAL EXTENSION SERVICE
J. E. Hutchison, Director, College Station, Texas

L-1089

THE NEW SCREWWORM THREAT

Weldon H. Newton
Extension Entomologist
Texas A&M University

Screwworms were on the rampage in Texas and other southwestern states again in 1972. Texas livestock producers in about 240 counties reported more than 90,000 screwworm cases – by far the worst outbreak since 1962 when the Southwest Screwworm Eradication Program began (figure 1).

1962	1963	1964	1965	1966	1967
49,484	4,916	223	446	1,203	835

1968	1969	1970	1971	1972
9,268	161	92	444	90,000+

Fig. 1. Number of screwworm cases reported in Texas since eradication program began.

Eradication officials attribute the 1972 outbreak to larger than normal overwintering populations which exploded during late winter and early spring. Favorable moisture and temperature conditions in late summer and fall of 1971 allowed larger population buildups further north in the state than usual. This was followed by an unusually mild winter which allowed screwworms to survive far north of their normal overwintering range. Heavy screwworm activity in northern Mexico also continued during the winter to provide a menacing source of flies with the potential to overwhelm intensive eradication efforts.

The eradication program since 1962 has saved Southwest livestock producers more than $1 billion in losses. Although 1972 was a serious setback, officials are optimistic that winter conditions have eliminated screwworms from most of the Southwest and reduced their overwintering range to extreme South Texas and Mexico where populations can be effectively restricted during 1973. With favorable weather and conscientious producer cooperation, all or most of Texas and the Southwest can again be free of screwworms during 1973.

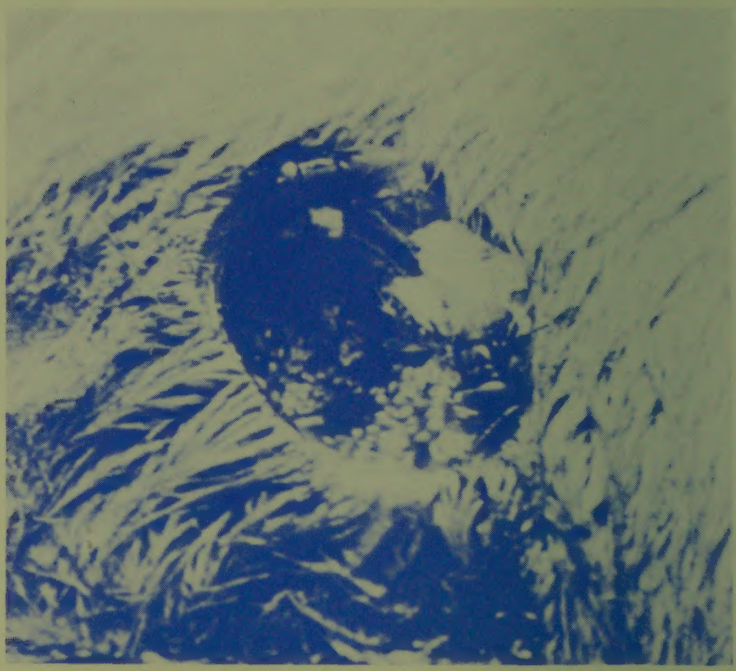
THE SCREWWORM MENACE

The screwworm, the maggot of one of a group of insects commonly called blow flies, infests practically all kinds of wild and domestic animals, poultry and man, but is more common among cattle, hogs, deer, sheep and goats. Screwworms infest only wounds of warm-blooded animals and attack only living flesh. Some maggots infesting these wounds may be from other blow flies which breed in carcasses. Carcass-breeding maggots usually are found feeding on soiled wool or in wounds containing decaying blood and tissue.

The screwworm fly, about twice as large as a housefly, is bluish-green with three longitudinal black stripes on its back.

The screwworm fly is about twice the size of a housefly and is bluish-green with three dark stripes on its back. Full-grown screwworm maggots, about ¾ inch long, have noticeable rows of spines that surround their bodies, giving them the screw-like appearance from which their name is derived. The front end of the screwworm tapers and contains the mouth hooks.

The true screwworm is distinguished from common blow fly maggots by the presence of two dark parallel air tubes. These tubes in full-grown screwworm maggots are readily visible with the naked eye, but are scarcely visible in common blow fly maggots. Most common blow fly maggots have white, yellow or gray colors. Screwworms have a pinkish tinge when they have completed feeding and are about ready to leave the wound. The only sure way to identify a screwworm case, however, is to collect maggots for microscopic examination by a specialist. Collection kits



Screwworm-infested wound with flies and egg mass.

are available from county Extension agents. Ten or more maggots should be collected from the wound and submitted to the SCREWWORM ERADICATION LABORATORY, P.O. BOX 969, MISSION, TEXAS 78572.

Mature screwworm larvae extracted from an infested wound.

Life History

The screwworm has four developmental stages: egg, larva (maggot), pupa and adult fly. A female fly may produce up to 3,000 eggs which she deposits on wounds in masses of 200 to 400 each during her lifetime of 2 to 4 weeks. Within 12 to 24 hours, eggs hatch into maggots which feed on the flesh for 5 to 7 days and then drop out of the wound to pupate ½ to 1 inch below the soil's surface. In warm weather, flies emerge from pupae after 7 to 10 days and work their way to the soil's surface. During the first few days of their adult life flies feed on the liquids of manure, meat and exudate from wounds, as well as nectar and plant juices. Flies usually mate when they are 2 days old. Females mate only once, but the males mate several times. After females are 5 to 6 days old, they seek wounded animals on which to deposit their eggs. About 21 days are required for the screwworm to complete a life cycle.

Nature of Damage

Maggots feed with the tapered head deep in the wound with only the blunt hind end exposed for breathing. The screwworms continually tear and rasp away living flesh, gouging out deep wounds which exude a brownish, bloody discharge. The maggots usually feed so deeply that only close observation reveals them projecting just above the surface of the bloody discharge. The bloody, characteristically foul-smelling wound attracts additional flies which deposit more eggs on or near the wound; consequently, thousands of maggots may infest a single wound. Single, neglected infested wounds can cause death of young animals and are often fatal in grown animals also.

SCREWWORM ERADICATION PROGRAM

Since 1962, the U.S. Department of Agriculture laboratory at Mission has produced and mass-released sterile screwworm flies, the males of which mate with native females. Because the native females mate only once, overwhelming native males with massive sterile male releases results in eventual self-annihilation since eggs laid by native females mated to sterile males do not hatch. When native populations are at low levels, chances for sterile mating are very *high.* On the other hand, when native populations are high, chances for fertile matings are *high.*

Two hundred million screwworm flies are produced at the Mission laboratory each week. Maggots are produced

in large rearing vats and the pupae are collected at the end of the larval development period. The pupae are then exposed to sterilizing doses of atomic radiation from a Cobalt 60 source, packaged in cartons and stored until adult flies emerge. Flies are then distributed at carefully calculated release rates at required intervals in infested areas where the sterile males mate with native, fertile females. If native infestations are low, an outbreak can be brought under control in a matter of weeks. The larger the native outbreak, the more difficult it is to eliminate screwworms through sterile male releases.

WHAT YOU CAN DO

Each treated or prevented screwworm case can avert the development of several hundred screwworm flies, each of which can infest several additional animals. Just one unnoticed or untreated case can produce enough flies to severely infest an entire area. The seriousness of the 1972 outbreak demands that all livestockmen and pet owners take the following action:

1. Inspect animals at least twice a week for wounds. Treat all wounds and navels of new born animals with a protective material[1/] regardless of whether they are infested.

2. Postpone animal surgery until cold weather when screwworms are inactive. If surgery absolutely must be performed, treat wounds thoroughly with a screwworm protectant [1/], inspect daily until completely healed and retreat wound as necessary.

Screwworm pupae develop ½ to 1 inch below the soil's surface.

3. Spray animals every 2 to 3 weeks until cold weather, if possible, with preventive sprays containing 0.25 percent coumaphos (Co-Ral®)or 0.5 percent ronnel (Korlan®)1/. These materials also control horn flies, ticks and lice and help to reduce populations of stable flies and horse flies. These treatments also control screwworms which might be undetected in small or obscured wounds.

4. Spray animals with one of the above materials before shipping to another area as a preventive measure against spreading possible infestations.

5. Upon receipt of livestock shipments from other areas, check each animal thoroughly for wounds or screwworm infestations. Treat all wounds and observe daily until healed.

6. If worm-infested wounds are found, collect a sample and mail to the Screwworm Eradication Laboratory, Box 969, Mission, Texas 78572. Eradication officials *must* know where and how many screwworms cases are occurring to properly plan sterile fly release programs.

Wound Treatments

Several screwworm remedies and wound protectants are available commercially from livestock and veterinary

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[1] *Note: All insecticides on livestock must be used in strict accordance with label precautions and restrictions. Carefully read and follow the product label before using to avoid possible contamination of meat or milk or animal injury.*

Protective treatment of navels of new-born animals is a must during screwworm outbreaks.

supply outlets. These materials, sold under several brand names, are formulated as viscuous smears, dusts, liquids and pressurized aerosols. Insecticides commonly used in these formulations include coumaphos (Co-Ral®), ronnel (Korlan®) and lindane. Restrictions on using these materials vary according to the class of livestock being treated. Be sure to thoroughly read the product label to determine whether it is appropriate for your use and follow any other restrictions listed.

Prevent Livestock Injuries

Protruding nails, barbed wire, obstacles or crowded conditions increase chances of livestock injuries which invite screwworm attack. Protect your animals by eliminating any conditions that might cause unnecessary cuts or scratches.

Support the Eradication Program

Practice good livestock management. Follow preventive measures. Inspect your herds regularly. Collect and report suspected screwworms. Treat all wounds and infestations. Encourage your neighbors to do the same. *Your full cooperation can prevent screwworm outbreaks and provide necessary support for sterile fly releases.*

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For additional information or assistance, contact your local county Extension agent or the Extension entomologist, Texas A&M University, College Station, Texas 77843.

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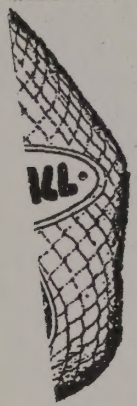

Bill includes screwworm program funds

Caller Washington Bureau

WASHINGTON — Senate passage of an agriculture appropriations bill under consideration will insure continuation of the screwworm facility in Mission, U.S. Rep. Bligio de la Garza of Mission believes.

He said the Office of Management and Budget has asked for $4.5 million to continue the program which is faced with cutbacks because of funding limitations.

The bill already has passed the House.

The Agriculture Department last week announced a phase-down in activities at the facility but then backed down after complaints from rahcners and congressmen.

The bill also includes $9 million to fight brucellosis in cattle and swine and $2.1 million for grants to states to carry out meat and poultry inspection porgrams.

Area youths